

## **USER GUIDE**

### **Diamond Logic® Builder Software (Basic Programming and Diagnostics Only)**

# **Navistar, Inc.**

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**Table 1 Summary of Changes**

Section	Description	Revision Number
Getting Started	Updated Installation Error Messages	2
	Added Delete Selected Vehicles Message	
	Updated note on firewall configuration	3
Menu and Toolbar Options	View Menu – Added Roles Description	2
	Tools Menu – Added Menu Descriptions	
	Help Menu - Added Change Log Description	
Tabs and Subtabs	Features Tab - Added Cab Display Description	
Changing Switch, Gauge and Pin-Out Configurations	<p>Added Second Note:</p> <p><b>NOTE – Using the Default All option may help to clear an error message that shows up in the Messages tab. Use caution to ensure that any undesired changes were not made.</b></p>	
Diagnosing Electrical Problems with Diamond Logic® Builder	Removed Note	
Programming a Vehicle	Added section Switch Pack Programming	4
	Added section Tire Pressure Monitoring System Programming	
	Added section Connecting TPMS Module With DLB	
	Added section TPMS Programming and Monitoring	
	Added section TPMS Programming For Cluster Display	

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## **SAFETY INFORMATION**

This manual provides general and specific maintenance procedures essential for reliable engine operation and your safety. Since many variations in procedures, tools, and service parts are involved, advice for all possible safety conditions and hazards cannot be stated.

Read safety instructions before doing any service and test procedures for the engine or vehicle. See related application manuals for more information.

Obey Safety Instructions, Warnings, Cautions, and Notes in this manual. Not following Warnings, Cautions, and Notes can lead to injury, death, or damage to the engine or vehicle.

### **Safety Terminology**

Terms are used to stress your safety and safe operation of the engine: Warning, Caution, and Note

**Warning:** A warning describes actions necessary to prevent or eliminate conditions, hazards, and unsafe practices that can cause personal injury.

**Caution:** A caution describes actions necessary to prevent or eliminate conditions that can cause damage to the engine or vehicle.

**Note:** A note describes actions necessary for correct, efficient operation.

### **Work Area**

- Keep work area clean, dry, and organized.
- Keep tools and parts off the floor.
- Make sure that the work area is ventilated and well lit.
- Make sure that a First Aid Kit is available.

### **Protective Measures**

- Wear protective safety glasses and shoes.
- Wear correct hearing protection.
- Wear cotton work clothing.
- Wear sleeved, heat protective gloves.
- Do not wear rings, watches, or other jewelry.
- Restrain long hair.

### **Vehicle**

- Shift transmission to neutral, set parking brake, and block wheels before doing diagnostic or service procedures.
- Clear the area before starting the engine.

### **Safety Equipment**

- Use correct lifting devices.
  - Use wheel chocks and stands.
-



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## **Engine**

- The engine should be operated or serviced only by qualified individuals.
- Provide necessary ventilation when operating engine in a closed area.
- Keep combustible material away from engine exhaust system and exhaust manifolds.
- Install all shields, guards, and access covers before operating engine.
- Do not run engine with unprotected air inlets or exhaust openings. If unavoidable for service reasons, put protective screens over all openings before servicing engine.
- Turn engine OFF and relieve all pressure in the system before removing panels, housing covers, and caps.
- If an engine is not safe to operate, tag the engine and ignition key.

## **Fire Prevention**

- Make sure that charged fire extinguishers are in the work area.

**NOTE – Check the classification of each fire extinguisher to make sure that the following fire types can be extinguished:**

1. Type A – Wood, paper, textiles, and rubbish
2. Type B – Flammable liquids
3. Type C – Electrical equipment

## **Batteries**

- Always disconnect the main negative battery cable first.
  - Always connect the main negative battery cable last.
  - Avoid leaning over batteries.
  - Protect your eyes.
  - Do not expose batteries to flames or sparks.
  - Do not smoke in workplace.
-

# INTRODUCTION



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**Figure 1 Diamond Logic Builder**

In 2001, Navistar, Inc, formerly known as International Truck and Engine Corporation, introduced the industry's first high-performance trucks. With this introduction, a very innovative and flexible electrical system employing multiplexing technology was introduced. The system is standard on all high performance trucks and several bus models. In addition, there are many options that can be ordered and / or added to the vehicle in the field.

The Diamond Logic® Builder (DLB) software combines the feature creation, programming, and diagnostic functions for the end user. This Diamond Logic® Builder User's Manual describes the software in detail and shows how to use it to maximize the efficiency and effectiveness of the industry's first high performance truck's electrical system integration.

### WHAT IS MULTIPLEXING?

Multiplexing is the technology of transmitting multiple unique electronic signals over one or two wires instead of over a bundle of many wires. Vehicular applications of multiplexing technology typically use just two wires for this function. Multiplexing allows these two wires to carry electronic data that can control a variety of electronic equipment. The number of wires needed to connect components is greatly reduced, which offers better reliability and improved vehicle uptime. Although limited multiplexing had been used previously by Navistar, the introduction of the industry's first high performance trucks has fully implemented this technology.

### COMPONENTS OF THE MULTIPLEXING SYSTEM

The multiplexed electrical system consists of the following components:

- Body Control Module (BCM)
- Remote Power Module(s)
- Remote Air Solenoid Module(s)
- Electronic Gauge Cluster
- Switch Packs
- Light Control Module (LCM)
- HVAC Controls
- Engine Controls
- Transmission Controls
- ABS Module
- Door Pods
- Stalk Shifter
- Tire Pressure Monitoring System (TPMS)
- CAN Based Headlight Modules
- Electronic Lift Axle Module (ELAM)
- Other modules, connected to a Data Link, supported by DLB

## INTRODUCTION

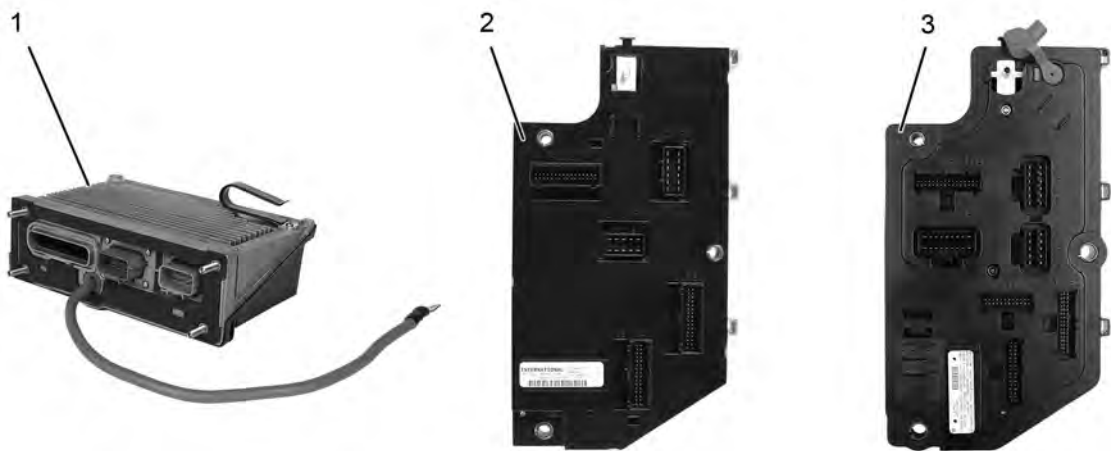
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### Body Control Module (BCM)

The Body Control Module (BCM) is a body systems computer used to control many of the vehicle's electrical functions. It is the heart of the multiplex system. When installed on trucks, all BCMs are located on driver-side lower kick panel. On bus applications, they are mounted to the underside and center of the dash.

The BCM receives inputs from driver controls, sensors, and switches providing outputs to vehicle loads, gauges, relays, and remotely mounted modules. Software to control a vehicle's specific electrical / electronic features and components is programmed into the ESC / BC using a computer and the Diamond Logic® Builder program.

Navistar has released three different generations of the BCM (Figure 2).



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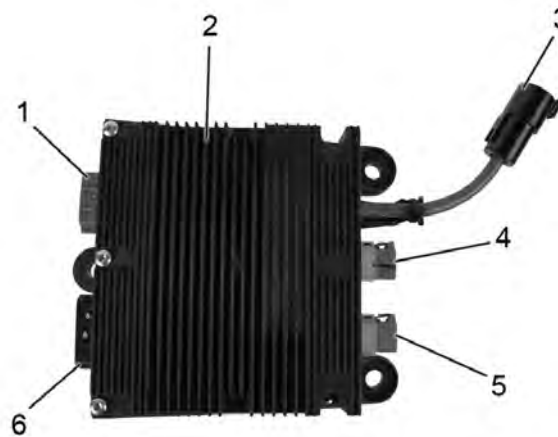
- |   |   |
|---|---|
| 1. Electronic System Controller (ESC)     | 3. Generation 4 Body Control Module (BCM) |
| 2. Generation 2 Body Control Module (BCM) |   |

**Figure 2 Three Generations of Body Control Module (BCM)**

**NOTE – The BCM is commonly referred to as Vehicle Control Module (VCM), Electronic System Controller, as well as the Body Control Module.**

### Remote Power Module (RPM)

Remote Power Modules serve as gateways into Navistar's electrical system. BCM programming allows modules to be programmed to control many different types of added body equipment. The base package for integration includes a module, which contains six 20-amp outputs, for controlling lights or other loads required for a vehicle's application (up to 80 amps total). Remote power modules may be controlled using pre-engineered features from Navistar or special customer developed features created using Advanced Logic in the Diamond Logic® Builder program. Remote Power Modules also include six inputs that can provide remote switching and feedback capability.



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- 1. J4 output connector
- 2. Remote power module
- 3. Power supply

- 4. Terminating resistor
- 5. Body data link controller
- 6. J3 remote input connector

**Figure 3 Remote Power Module**

## INTRODUCTION

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### Remote Air Solenoid Module (RASM or MSVA)

Through the development of a family of Remote Air Solenoid Modules, air accessory devices such as horns, Power Takeoffs (PTO), sliding fifth wheel locks, suspensions, transfer cases, differential locks, power divider locks, auxiliary transmissions, and two-speed axles and more can be controlled by electric in-cab switches. Currently, there are two types of Remote Air Modules, a seven-channel and a four-channel version. Both are factory installed with in-cab switches. The solenoids can operate as normally open or normally closed.

**NOTE – The seven-channel module is not available in post-2007 vehicles.**



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**Figure 4 Seven-Channel Air Module**



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**Figure 5 Four-Channel Air Module**

### Electronic Gauge Cluster (EGC)

Located in the instrument panel, the Electronic Gauge Cluster includes the instrument gauges, warning indicators, and an LCD digital display. The LCD digital display provides odometer, transmission gear indication, compass heading, and outside temperature displays. The instrument cluster displays the crucial operational functions of the vehicle. The number of gauges and their placement can vary depending on the options selected. An audible alarm can be programmed in DLB to sound when certain gauge values read out of range.

The cluster's gauges are controlled by the BCM via the J1939 Data Link.



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**Figure 6 Base Instrument Cluster**

The Base Instrument Cluster displays numerous functions, alerts, and indicators through analog gauges, indicators, and an information LED screen. Depending on the cluster configuration that is selected, there can be six to eight analog gauges in the instrument cluster that provide information to the operator. The Base Instrument Cluster is available on 2017 and later International® vehicles.

An LED screen is located in the middle of the cluster that displays vital information to the operator. A push button, located on the right, is used to scroll through the various menus.



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**Figure 7 Premium Instrument Cluster**

The Premium Instrument Cluster is an upscale version of the EGC. The cluster displays numerous functions, alerts, and indicators through analog gauges, indicators, and an information LCD screen. Depending on the cluster configuration that is selected, there can be six to eight analog gauges in the instrument cluster that provide information to the operator.

The Premium Instrument Cluster uses a 5-in LCD screen, located between the tachometer and speedometer. There are various menus that can be navigated through using the Cluster Display Control (CDC). The CDC is located on the instrument panel to the lower right of the Instrument Cluster. A toggle joystick allows the operator to scroll through various menus, and when pressed, a selection is made. The back button, represented by an arrow, can be used to return to previous menus and screens.



### Rocker Switch Packs

The Rocker Switch Packs are provided in 6-switch and 12-switch modules. Commonly found in the center panel, they are used to control loads such as fog lights, heated mirrors, and Power Take Off (PTO) options. Diamond Logic® Builder software makes it easy to move and relocate switches.



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**Figure 8 Rocker Switch Pack 2007 – 2016 (Typical)**



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**Figure 9 Rocker Switch Pack 2016 – Present (Typical)**

When multiple switch packs are used, they are daisy-chained together to eliminate excess wiring. Switch actuators control the signals that are sent from the switch pack.

## INTRODUCTION

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On vehicles built between 2007 and 2016, the switch pack communicates on the switch data link. Switch packs on these vehicles have a GREEN Light Emitting Diode (LED) indicator that provides the operator with information on the load and switch status.

On vehicles built in 2017 or later, the Switch Pack(s) communicate on the Human Machine Interface (HMI) data link. These switch packs have an LED indicator with 7 different color options. The color of the LED is dependent on the programmed feature code of the switch or the custom logic that is assigned to the switch.

### Light Control Module (LCM)

The Light Control Module (LCM) contains a light multi-switch for the fog lights, headlights, parking lights, and the option for rear fog lights.



- 1. Headlight multiswitch
- 2. Dimmer dial

- 3. Switch actuator 1
- 4. Switch actuator 2

**Figure 10 Light Control Module (Typical)**

The LCM is located in the dash panel on the left side of the steering wheel. The LCM communicates with the Body Control Module (BCM) over the Low Speed HMI data link. The LCM also contains space for two optional switch actuators, which can be changed and programmed with DLB.

## HVAC Controls

An electronic module located in the center of the instrument panel controls the HVAC system. The HVAC controls eliminate complexity by controlling functions such as the air temperature and air outlet selection with electronic motors.



**Figure 11 Two Examples of HVAC Control Panels**

## Engine Control System

The engine control module shares engine information such as RPM, vehicle speed, water temperature, and oil temperature with any component connected to the data link that requires the information. The engine also receives commands for cruise control, clutch and brake status, and engine fan control from the BC / BCM.

## Electronic Transmission Controls

The transmission controller communicates gear position, transmission oil temperature, and warning light status with the electronic gauge cluster on the drive train J1939 Data Link.

## Antilock Brake System (ABS)

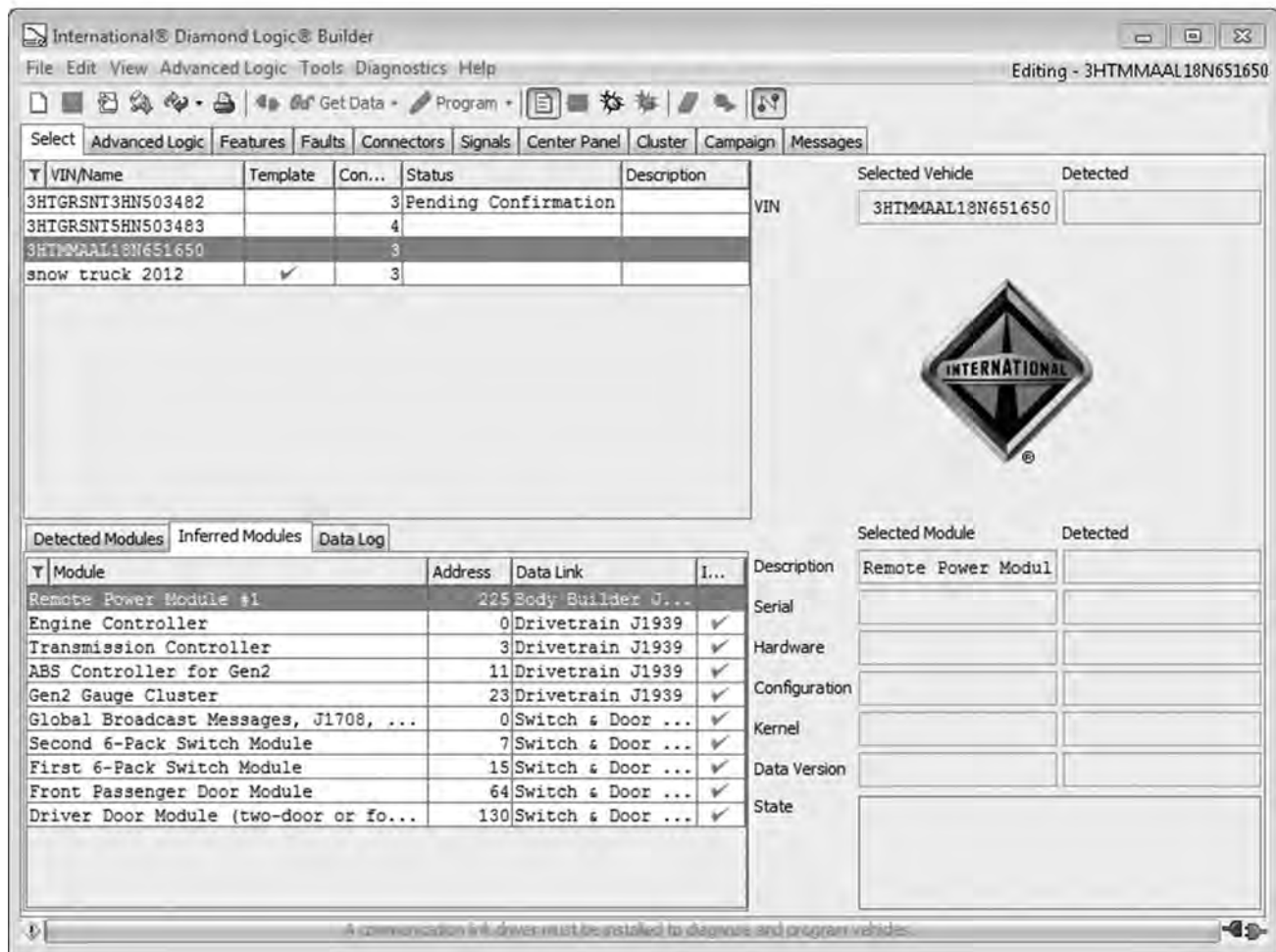
The Antilock Brake System prevents wheel lock-up during vehicle braking events. The system communicates with the BC / BCM and the engine controller to limit engine torque, disable retarders, and control the ABS, ATC and trailer ABS warning lamps in the electronic gauge cluster.

## INTRODUCTION

### THE DIAMOND LOGIC® BUILDER SOFTWARE

Diamond Logic® Builder software provides the ability to program, diagnose, and simulate features in the Body Control Module (BCM) module. The Diamond Logic® Builder program allows users to configure switches, the gauge cluster, the parameters that are programmed in the BC / BCM, and programming and diagnosing the Tire Pressure Monitoring System (TPMS) system.

The Advanced Logic capability in DLB is covered in a separate manual. Advanced Logic provides the ability to write custom features beyond what is offered by the advertised feature codes. It is not usually offered at the Dealer level and is primarily intended to be used by Body Builders. Dealers do have the ability to view and diagnose Advanced Logic when it has been installed on a vehicle.



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Figure 12 Diamond Logic® Builder, Main Window

## GETTING STARTED

### SYSTEM REQUIREMENTS

#### Minimum Requirements

- 150 MB of free hard disk space
- Internet connection

#### Recommended Requirements

- Pentium® IV class processor or greater
- 1 GHz processor or faster
- High-speed Internet connection
- 500 MHz processor or faster
- Windows® 7 or greater
- 512 MB of RAM minimum
- One or more RP1210A compatible communication devices (See Recommended Adapters below)

Improved system performance will occur with the installation of increased RAM

#### Recommended Adapters

- NEXIQ™ Technologies – USB-Link2
- Dearborn Group Technologies – DPA 5
- Noregon® Systems, Inc. – DLA+, DLA+ Wireless

Other interface cables MAY work with the Diamond Logic® Builder program.

#### Communication Link Drivers

- DLB uses standard RP1210A drivers for communication. The drivers are specific to the communications device and are not installed with DLB.

### INSTALLING THE DIAMOND LOGIC® BUILDER SOFTWARE

To install the Diamond Logic® Builder software:

**NOTE – If you do not have a User ID, you are a new user. If you have a User ID, you are a current user, even if you have never used it. If you are part of the OnCommand, you have an User ID.**

1. Prior to installation, a DLB product key must be obtained for each computer on which the DLB software is to be installed. Product keys expire after a year and must be reactivated to allow access to the program.
2. Using the web browser of your choice, navigate to the Diamond Logic® Builder page in Navistar's site:

<https://navistarservice.snapon.com>

3. From the home page, search DLB in the upper right-hand corner and select DLB Software.
4. Select Installation Instructions tab to follow the step by step instructions to install the software.

#### Installation Error Messages

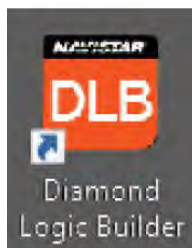
The error code(s) that may appear during the installation process are self-explanatory. Refer to the Documents tab for the Navistar Software 800 Codes document.

## LAUNCHING THE DIAMOND LOGIC® BUILDER SOFTWARE

**NOTE** – For installation instructions, refer to *Installing the Diamond Logic® Builder Software* (page 13).

To launch Diamond Logic® Builder, do one of the following:

- Double-click the Diamond Logic® Builder program icon on the Windows desktop.
- Select Diamond Logic® Builder from the Programs list in the Windows Start menu.



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**Figure 13 DLB Program Icon**

After a few moments, the following Navistar message will appear:



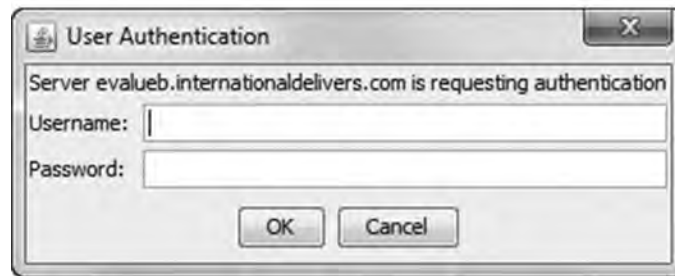
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**Figure 14 DLB Splash Page**

## GETTING STARTED

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The User Authentication window appears. Enter your DLB username and password and click OK.



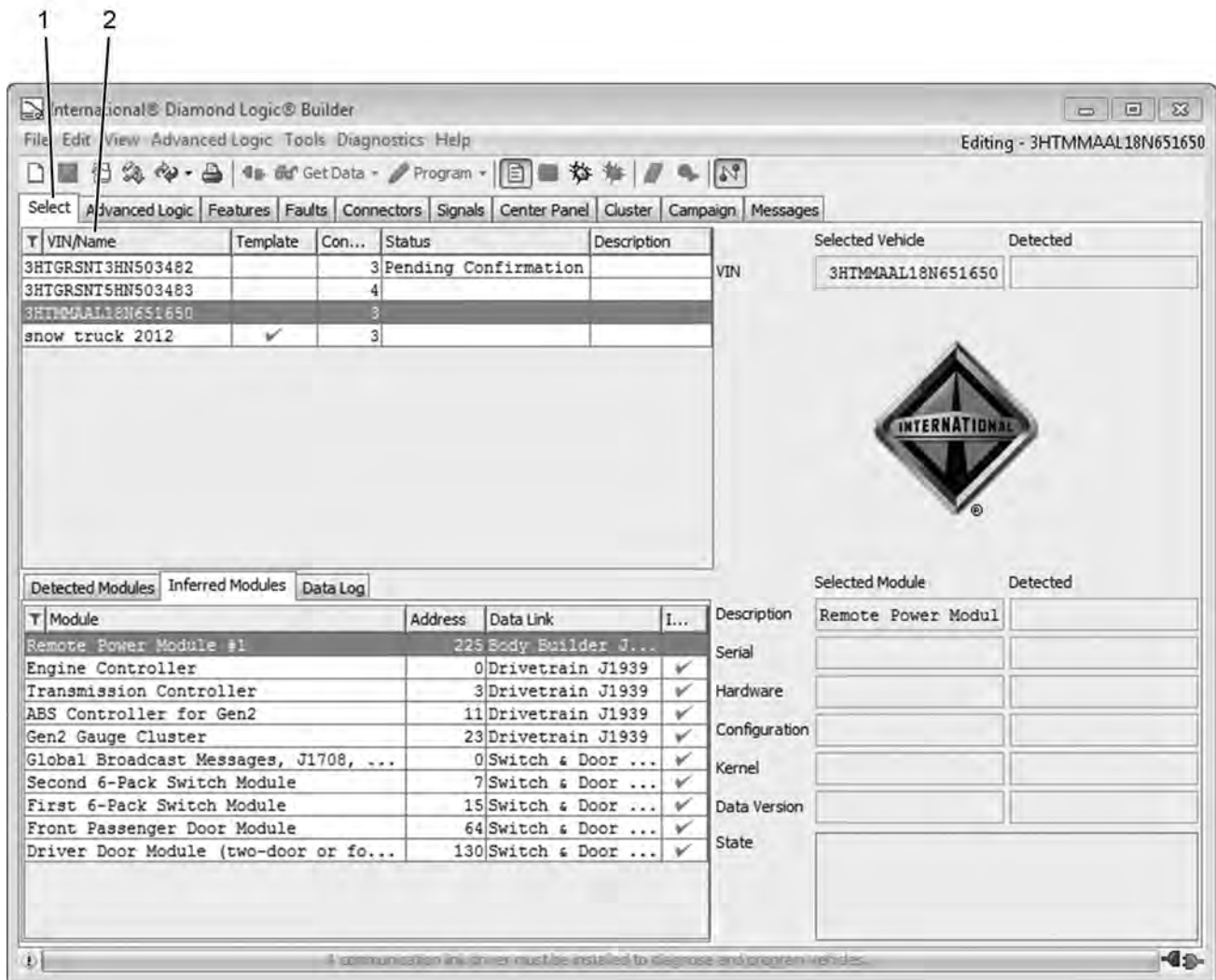
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**Figure 15 User Authentication Window**

**NOTE –** It is possible the user will also see a brief notice that the software is updating. If software updates are available, they occur when the user starts the program, while connected to the Internet.



When the Diamond Logic® Builder software is started, the main window is displayed (Figure 15).



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1. Select tab

2. VIN / Name column

**Figure 16 DLB Main Window**

## GETTING STARTED

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The following message (Figure 16) may be displayed as the Diamond Logic® Builder software is started.



**Figure 17 Delete Selected Vehicles**

**NOTE – If this message is displayed (Figure 16), reduce the number of vehicles displayed in the Select tab (Figure 23 Item 1, Item 2). Doing so can enhance system performance.**

To delete a vehicle:

1. Right-click on a vehicle file as shown highlighted in Figure 15.
2. Select delete.

## CONNECTING TO THE VEHICLE

The computer is connected to the vehicle using a RP1210A compliant interface device.

**NOTE – Navistar requires a RP1210B compliant interface cable that supports J1939 and J1708 standard.**



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**Figure 18 NEXIQ USB Link 2 Interface Device**

There are two cables included with the interface device. One of the cables links the Data Link Connector (DLC) on the vehicle to the interface device.

## GETTING STARTED

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On most International® trucks, the Data Link Connector is located underneath the instrument panel, to the far left, on the driver-side.

On most IC Bus® models, the Data Link Connector is located underneath the instrument panel, in the middle of the panel.



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**Figure 19 Data Link Connector**

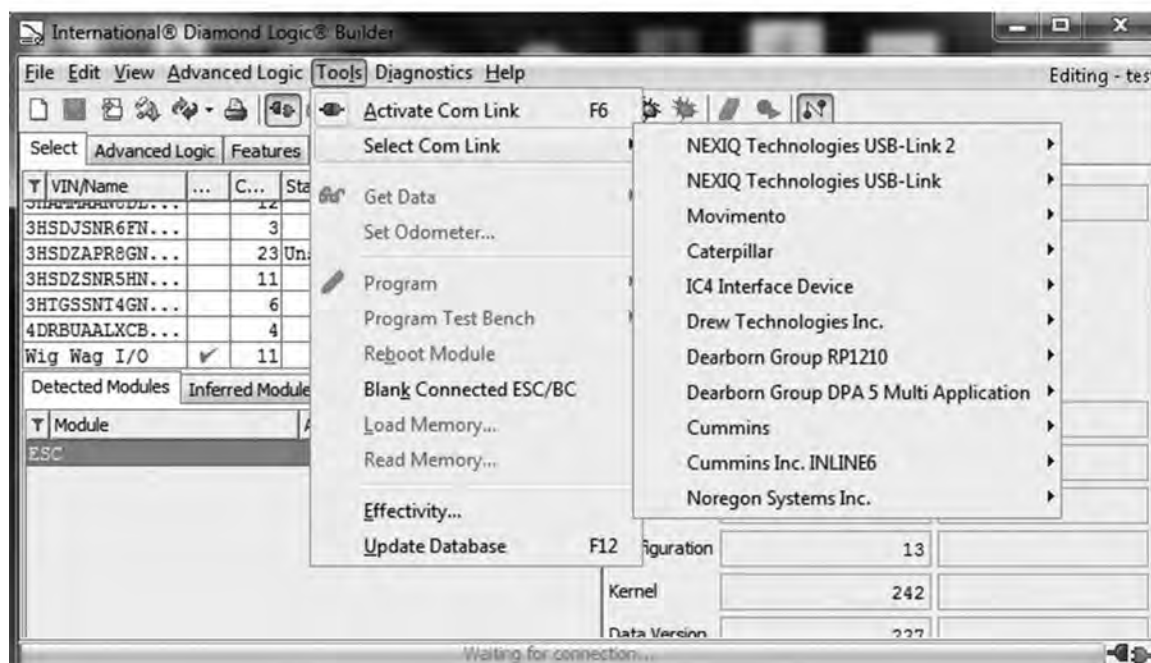
The other cable connects to a USB port on your EZ-Tech® / computer to the interface device.



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**Figure 20 EZ-Tech®**

Preferred interface devices are available from Navistar. However, other interface cables MAY work with the Diamond Logic® Builder program. The type of cable being used needs to be selected in the Diamond Logic® Builder program. In addition, the correct cable driver needs to be installed on the computer.



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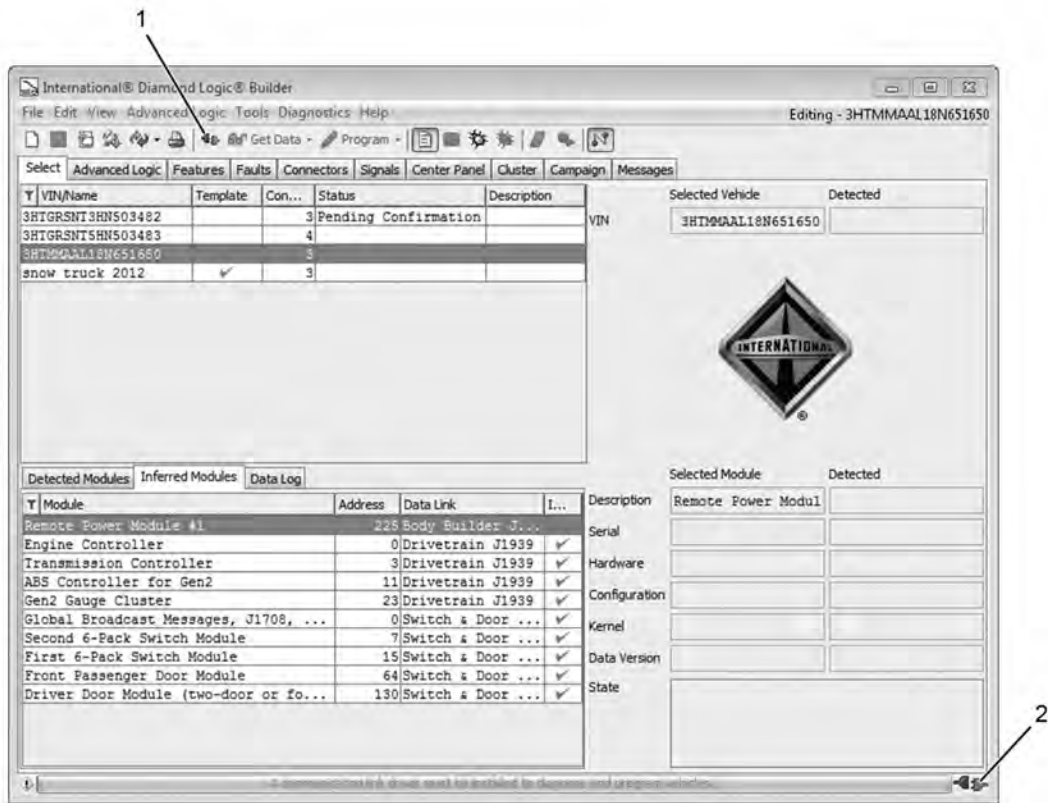
**Figure 21 Selecting the Interface Cable Type**

Contact the interface cable supplier or visit the supplier's website for updated software drivers.

**NOTE –** If communications problems are experienced with one of these cables, disconnect the cable from the truck, then reconnect and try again. Pressing the F6 key on the computer will toggle between activating and deactivating the Com Link.

VERIFYING THE CONNECTION BETWEEN THE COMPUTER AND THE VEHICLE

This section describes how to tell if the vehicle is connected correctly to the computer. Launch the Diamond Logic® Builder software and then connect the interface cable between the computer and the vehicle.



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1. Connect / Disconnect toolbar icon

2. Connect / Disconnect indicator

**Figure 22 Main Window, Connected / Not Connected Icons**

The Connect / Disconnect indicator (shown above disconnected) is in the lower right corner of the Main Window. The Connect / Disconnect toolbar icon will also reflect the current connection status.

The icon as shown below indicates that the computer is properly connected and is communicating with the data link in the vehicle.



**Figure 23 Connected Icon**

If the computer is not connected or communicating with the data link in the vehicle, it will appear as shown below:



**Figure 24 Not Connected Icon**

**NOTE – If the interface cable is connected correctly to the computer and this icon does not appear, check to ensure the correct cable is assigned to the applicable port under the Tools menu. In addition, ensure that the correct port has been selected and that the Com link is active.**

The indicator lights, on the Interface Cable, should identify when the cable is connected and functioning properly. If the Diamond Logic® Builder software does not show a Connected icon, tap the F6 key on the computer. Communication with the truck should resume in a few seconds.

When the computer, running the DLB software, with a properly configured interface cable, is connected to the module, a status line will scroll across the bottom of the DLB screen. After data has been collected, the module information should be populated in the Detected column of DLB. If this column is not populated, DLB is not communicating with the module.

**NOTE – You will not be able to Diagnose or Program a module when the module information does not populate the Detected column.**

If the module information does not populate the Detected column, recycle the key, then disconnect and reconnect the interface cable from the diagnostic connector on the truck.

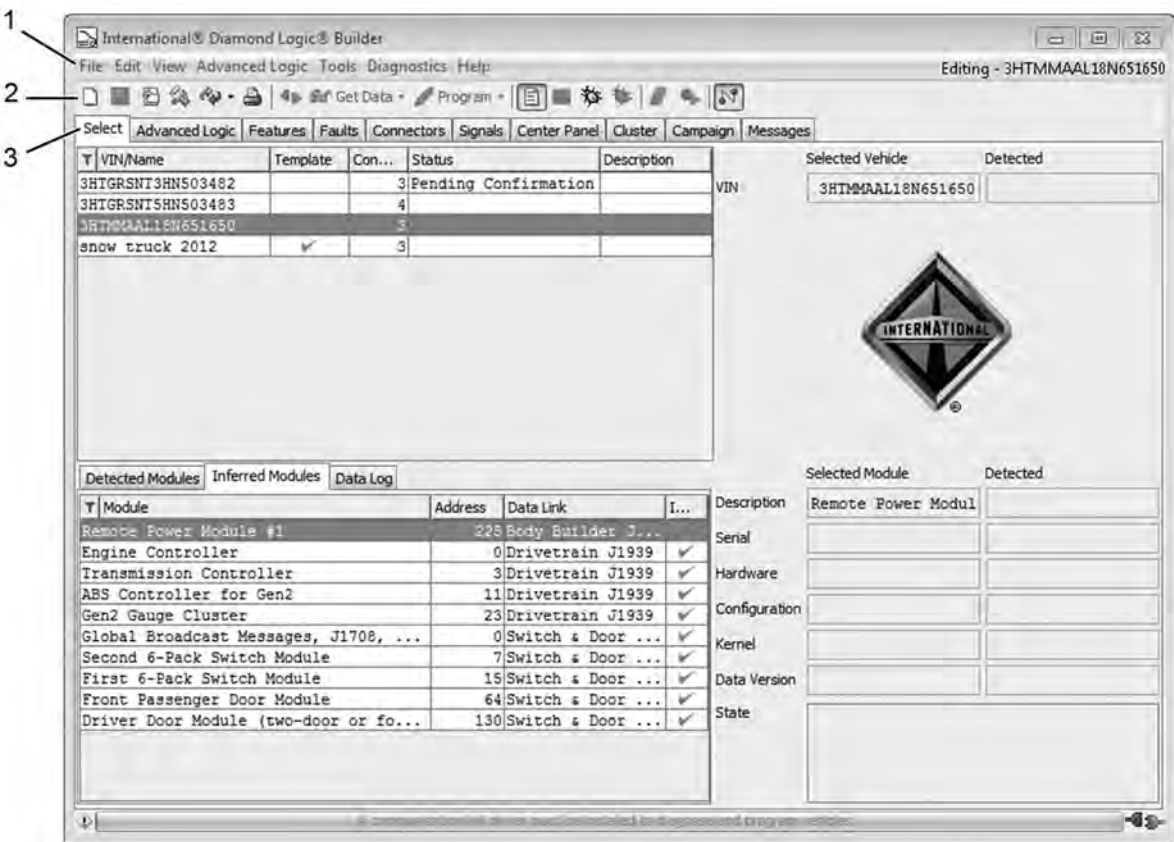
If you cannot connect to the module, try to connect to another truck to rule out a problem with your computer or interface cable. Try to connect to the module with a different computer and interface cable to eliminate a problem with the truck or module.

MENU AND TOOLBAR OPTIONS

In this section, the menus and toolbar will be briefly outlined. In subsequent sections, the various windows, buttons, and functions will be described in detail.

MAIN WINDOW

This is the main window of the Diamond Logic® Builder program.



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1. Menu bar
2. Toolbar
3. Row of tabs

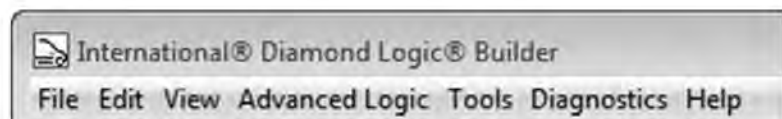
Figure 25 The Main Window

Each of the three items called out in the figure above provide access to some of DLB's functions, and each will be covered in detail in the following sections.



## MENU BAR

The menu bar at the top of the main window contains seven drop-down menus.



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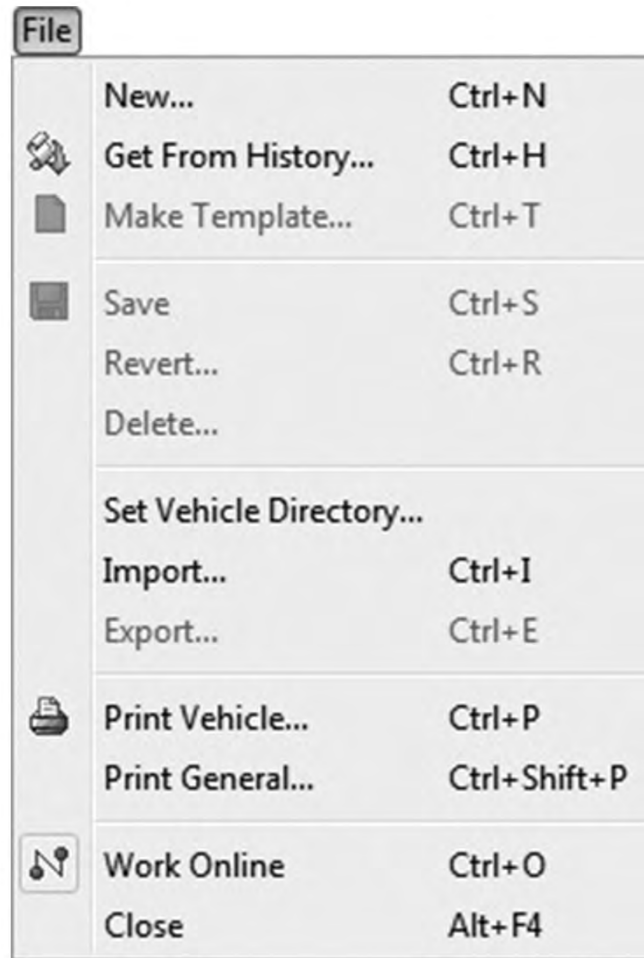
**Figure 26 Menu Bar**

The menus are defined as follows:

Name	Description
File	Used to manage vehicle data.
Edit	Used to manipulate and edit vehicle data.
View	Used to view data from different perspectives.
Advanced Logic	Used to view any advanced logic programmed on the vehicle.
Tools	Used to manipulate data when connected to selected vehicle.
Diagnostics	Used to troubleshoot a vehicle.
Help	Used to access the software's help system.

Each menu is described in detail in the following sections.

### File Menu



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**Figure 27 The File Menu**

Name	Shortcut	Description
New	Ctrl+N	Opens the New Template window, which is used to define a new template from scratch (page 98).
Get From History	Ctrl+H	Opens a window that allows VIN files to be requested from Navistar over the Internet (page 93).
Make Template	Ctrl+M	Allows the operator to make a template by copying a selected VIN or template (page 99).
Save	Ctrl+S	Saves changes made to a VIN.
Revert...	Ctrl+R	Allows the operator to undo changes and revert to a previously saved version of the VIN.
Delete		Deletes the selected vehicles.

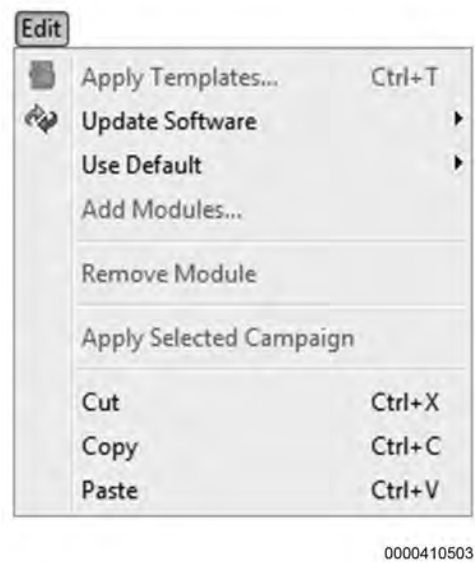
Name	Shortcut	Description
Set Vehicle Directory...		Sets the default directory in which DLB will save VIN and template files.
Import...	Ctrl+I	Imports vehicle file(s) from a folder other than the default directory. (The import and export functions are typically used to copy files from one computer to another.)
Export...	Ctrl+E	Exports vehicle file(s) to a folder other than the default directory.
Print Vehicle...	Ctrl+P	Prints all vehicle parameters and information.
Print General...	Ctrl+Shift+P	Prints screen information of vehicle selection. This function changes when you change tabs. For instance, if you just want to print the switch positions, go to the Center Panel tab before you select the File menu.
Close	Alt+F4	Closes the DLB program.

**NOTE – These menus could contain additional items depending on your DLB access permissions.**

## MENU AND TOOLBAR OPTIONS

### Edit Menu

The Edit Menu allows the user to manipulate and edit data.



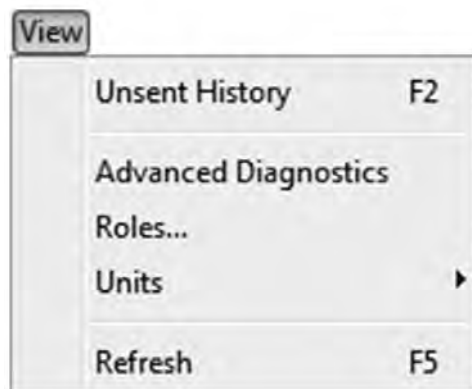
**Figure 28 The Edit Menu**

The items in this menu are defined as follows:

Name	Shortcut	Description
Apply Templates	Ctrl+T	Applies a template to a selected vehicle. (page 101).
Update Software		Updates Navistar software features without any programmable parameter changes.
Use Default		Allows resetting of pin mapping, gauge location, and switch mapping to default locations.
Add Modules		Adds modules to the selected vehicles and templates.
Remove Module		Removes modules from the selected vehicle.
Apply Selected Campaign		Applies any selected campaign that is shown in the Campaign tab.
Cut	Ctrl+X	Same as the standard Windows editing function.
Copy	Ctrl+C	Same as the standard Windows editing function.
Paste	Ctrl+V	Same as the standard Windows editing function.

## View Menu

The View Menu allows the user to view additional data and / or change the units of the data.



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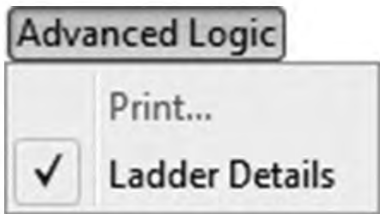
**Figure 29 The View Menu**

The items in this menu are defined as follows:

Name	Description
Unsent History	All vehicle programming files that have not been sent to Navistar.
Advanced Diagnostics	All vehicle signals in diagnostics.
Roles	Available permissions when the user is logged in correctly.
Units	Allows selection of measurement system. <b>English:</b> uses English units for measurements. <b>Metric:</b> uses metric units for measurements.
Refresh	Rereads data and refreshes screen display.

**Advanced Logic Menu**

Advanced Logic allows the user to view logic blocks. Advanced Logic is active only when a logic block under the Advanced Logic tab is selected.



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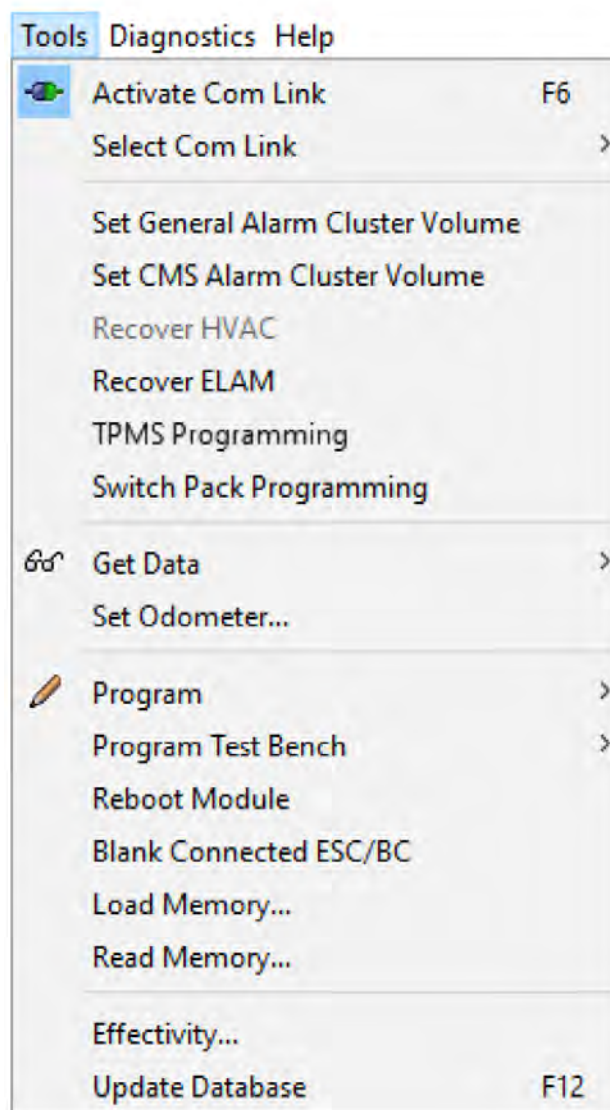
**Figure 30    The Advanced Logic Menu**

The Advanced Logic menu includes the following items. There are more options displayed when logged in with Advanced Logic permissions.

**NOTE – Advanced Logic programming is available only to personnel trained and certified at this level.**

Name	Description
Print	Prints ladder logic and selected logic block.
Ladder Details	Shows mapped signals on ladder.

## Tools Menu



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Figure 31 The Tools Menu

**NOTE** – Items and functions displayed in the tools menu will be based on user access level.

## MENU AND TOOLBAR OPTIONS

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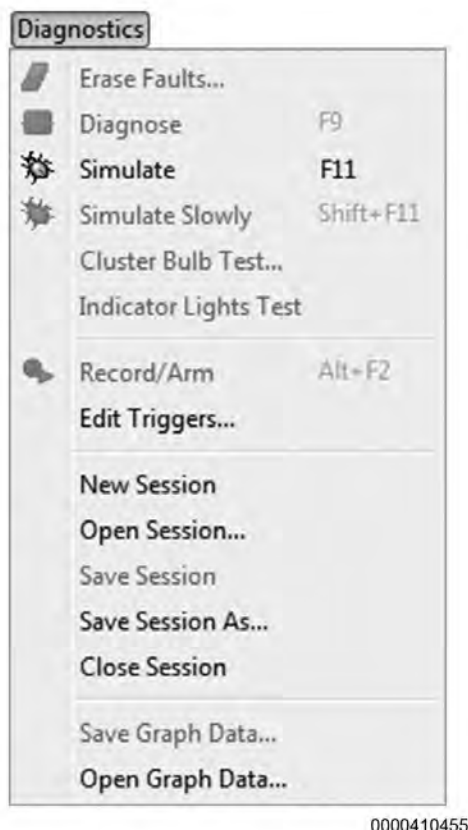
**NOTE – Items and functions displayed in the tools menu will be based on user access level.**

Name	Shortcut	Description
Activate Com Link	F6	Turns on / off continuous controller hardware scan on communications link.
Electric Lift Axle Module (ELAM)		Restores the Electric Lift Axle Module programming when the module programming update fails and the ELAM module is not included in the detected module list.
Select Com Link		Allows for the selection of a communications port to match selected cable.
Set General Alarm Cluster Volume		Adjusts the General Alarm Cluster volume.
Set CMS Alarm Cluster Volume		Adjusts the Collision Mitigation System Alarm Cluster volume.
Recover HVAC		Restores the Front HVAC Module programming when the module programming update fails and the HVAC module is not included in the detected module list.
Tire Pressure Monitoring System (TPMS) Programming		Configures Tire Pressure Monitoring System (TPMS) (If Equipped).
Switch Pack Programming		Configures switch packs.
Get Data	F7	Reads vehicle data from controller.
Set Odometer		Programs the current mileage into the gauge cluster (page 157).
Program	F8	Writes selected vehicle configuration into controller.
Reboot Module		Allows a reboot of a module without disconnecting the power feed to the unit.



## Diagnostics Menu

The Diagnostics Menu allows the user to diagnose a vehicle. Most diagnostic items may be used only when the Diamond Logic® Builder program is placed in Diagnostic Mode.



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**Figure 32 The Diagnostics Menu**

The Diagnostics Menu contains the following items:

Name	Shortcut	Description
Erase Faults	F10	Erases diagnostic faults.
Diagnose	F9	Places DLB into Diagnostic Mode while connected to a vehicle.
Simulate	F11	Places DLB into Simulate Mode. No vehicle connection required.
Simulate Slowly		When DLB is in Simulate Mode, adjust the speed of the simulation. This is typically used to slow down simulation speed when attempting to observe events that occur very quickly.
Cluster Bulb Test		Turns On / Off all ESC / BC driven (not CF model) gauge cluster warning lights.
Indicator Lights Test		Turns On / Off all ESC / BC driven (not CF model) indicator lights.
Record / Arm		Starts / Stops DLB Data Recorder.

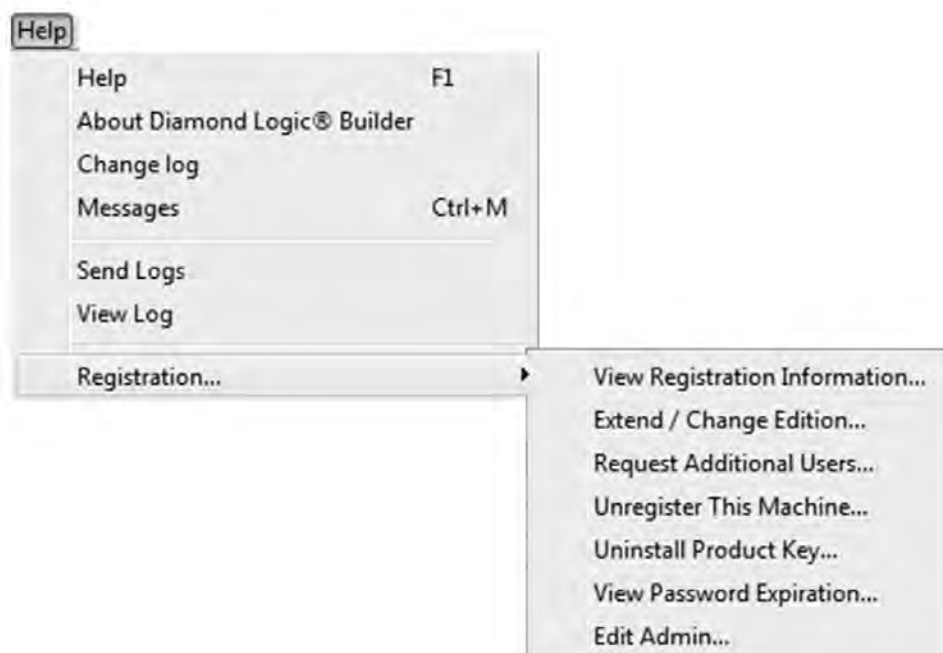
## MENU AND TOOLBAR OPTIONS

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Name	Shortcut	Description
Edit Triggers		Sets up signal triggers for recording.
New Sessions		Opens a new signal recording session.
Open Session		Opens an existing signal session.
Save Session		Saves a signal session to the computer memory device.
Save Session As		Closes any open Session.
Close Session		Closes any open Session.
Save Graph Data		Saves recorded signal graph data to a specified file.
Open Graph Data		Opens a recorded signal graph data from a specified file.

## Help Menu

The Help menu allows the user to seek information about the program's terms and processes.



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**Figure 33 The Help Menu**

Name	Shortcut	Description
Help	F1	Opens Help function. Help includes: configuring vehicles, Advanced Logic, programming icon types, ladder logic, structured logic, units of measure, diagnostics and acknowledgments
About Diamond Logic® Builder		Shows the Diamond Logic® Builder program version information.
Change log		Opens web site that identifies the most recent DLB version and database.
Messages		Displays messages from the system when a user is online. These messages appear at login if they are not turned off, on the message window.

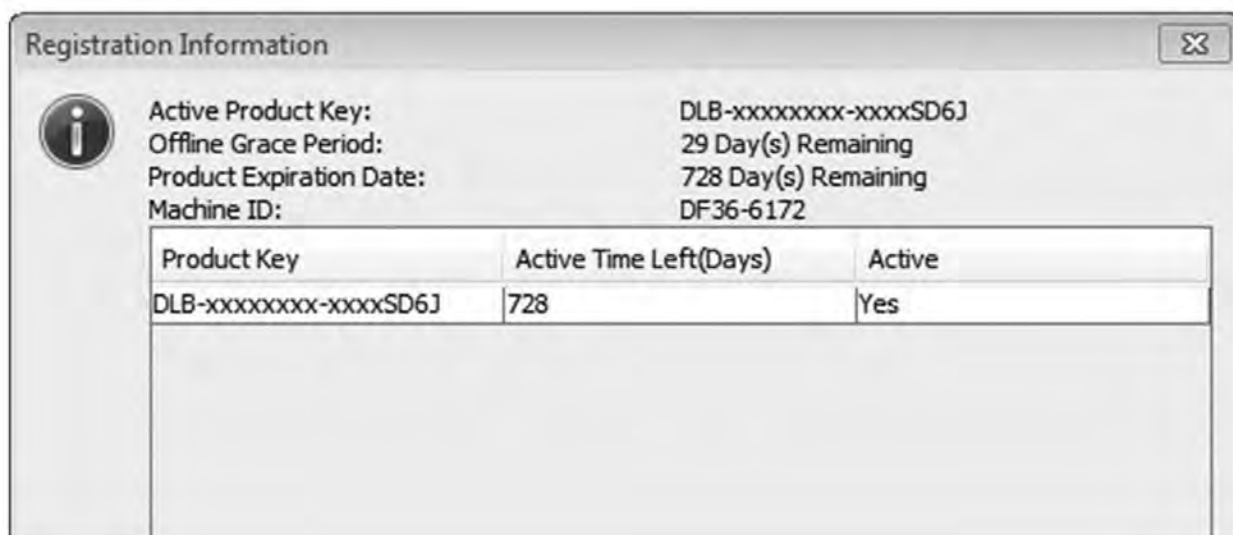
## MENU AND TOOLBAR OPTIONS

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Name	Shortcut	Description
Send Logs		Logging is used only by DLB support and should only be turned on when directed by engineering.
View Logs		
Registration...		Displays registration information for DLB on this system and other computers using the same product key.  If you have a multiuser license for the DLB software, the first user to install the software with your product key becomes the administrator for the individual user licenses. Some items on this menu are visible only to the administrator.

**Registration Sub-Menu**

Name	Description
View Registration Information...	Provides information about the product key, including parts of the key values, the system name associated with the key, and information about time left before the expiration expires.
Extend / Change Edition...	Provides the option to enter a new product key to change or extend the days left until the registration expires.
Request Additional Users...	This option requests additional Usernames to be used with DLB.
Unregister this machine...	This option unregisters the current installation of DLB. This will force DLB to close. Reopening DLB on this computer will automatically reregister the installation. To use this Product ID on another computer, install it on the other computer before reopening it on this computer.



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**Figure 34 Registration Information Window**

### TOOLBAR

The toolbar at the top of the main window displays buttons that correspond to many frequently used functions in the menu bar.










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**Figure 35 The Toolbar**

The icons in the toolbar include the following:

Item	Icon	Description
1		Create a new template.
2		Save vehicle and template changes on your computer. However, changes will not be programmed into the vehicle until the program function is invoked.
3		Apply configuration to selected vehicles.
4		Get vehicle information from Navistar.
5		Update Navistar® software features and kernel on selected vehicles without any application or programmable parameter changes.
6		Print configuration for selected vehicle.
7		Turn On / Off continuous controller hardware scan on communications link.
8		Read vehicle data from controller.
9		Write selected vehicle configuration into controller.

Item	Icon	Description
10		Edit vehicle mode for the selected vehicle. Turns off Diagnostic Mode and Simulate Mode.
11		Places DLB in Diagnostic Mode when controller is detected on communications link.
12		(GREEN) Places DLB in Simulate Mode for the selected vehicle configuration.
13		(RED) Adjust the speed of the simulation.
14		Clear fault log and previously active faults from cluster.
15		Start signal recorder when controller is detected on communications link.
16		Go online / offline with the Internet connection.

# TABS AND SUBTABS

## USING DATA TABLES IN THE DLB INTERFACE

Most of the tabs in DLB display their information as a table. The tables provide a number of functions for viewing and sorting the presented data:

- Enable or disable the display of each column
- Sort rows by the contents of a selected column
- Bring rows that contain specified text or values to the top
- Change the width of individual columns

### Enabling and Disabling the Display of Individual Columns

Right-clicking any column heading will display the Column Selection menu.

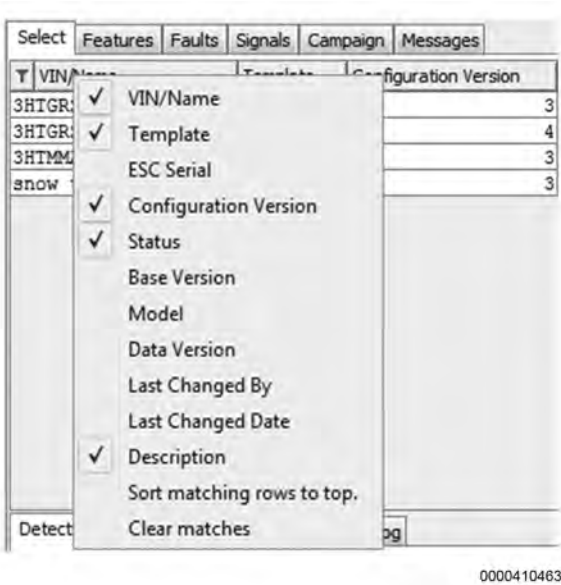


Figure 36 Column Selection Menu

Selecting a column name in this menu adds or removes its check mark.

- Checked columns will be displayed in the table
- Unchecked columns will be hidden in the table

**NOTE – Most column selection menus in DLB include two final items that are NOT column names: Sort matching rows to the top and Clear matches. These functions are part of DLB's Filter Feature (page 41).**



### Sorting Rows by the Contents of a Specific Column

Left click any column header to sort the list by the contents of that column. Clicking the same heading again reverses the order of the sort (indicated by the up or down arrow on the right end of the clicked heading).

Parameter ▾	Value
Wipers_Lo_Current	0
Wipers_Hi_Current	15
Vehicle_Speed_Min_WL	0
Vehicle_Speed_Max_WL	84.999
Vehicle_Speed_Filter_Param	255
Vehicle_Speed_Alrm_Ty_Param	0
Stop_Override_Hazard_Enabled	<input checked="" type="checkbox"/>

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**Figure 37 Sorting Downwards by Contents of Parameter Column**

Parameter ▴	Value
AutoLock_Speed	15
BC_RCD_Temp_Out_Compressor_Off	24
Battery_Voltage_Alrm_Ty_Param	25
Battery_Voltage_Filter_Param	255
Battery_Voltage_Max_WL	15
Battery_Voltage_Min_WL	12
DTRL_Enabled	<input checked="" type="checkbox"/>
Dome_Light_Dim_Enable	<input checked="" type="checkbox"/>

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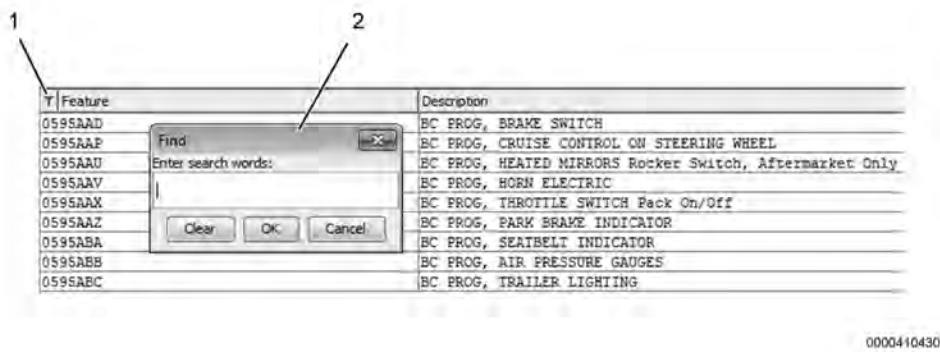
**Figure 38 Sorting Upwards by Contents of Parameter Column**

Note that each column has its own sorting rules:

- A column that contains text entries is typically sorted alphabetically.
- A column that contains numerical entries is typically sorted by value.
- A column whose entries are all checkboxes typically would sort the entries into checked items vs. unchecked items.

Bringing Rows That Contain Specified Text to the Top

Refer to the figure below for items in parentheses.



1. Filter button

2. Find window

Figure 39 The Filter Feature

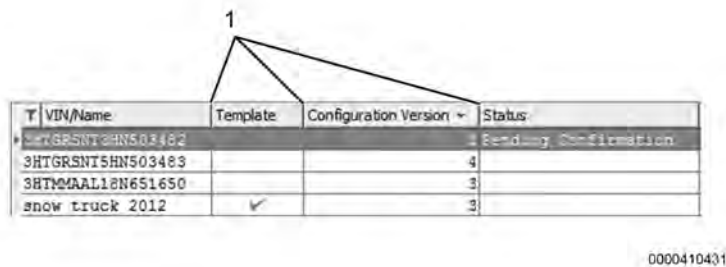
1. Click the Filter button (Item 1) in the upper-left corner of the table. The Find window appears (Item 2).
2. Enter the text that you wish to search for.
3. Click OK.

Any rows that contain a match for the entered text will now appear at the top of the table with a mark on the left. See highlight on Figure 40.

**NOTE – The Find window can also be opened by selecting Sort matching rows to top in the Column Selection Menu (Figure 36).**

To return the rows to their original order, select Clear Matches in the Column Selection Menu (Figure 36).

Changing the Width of Columns



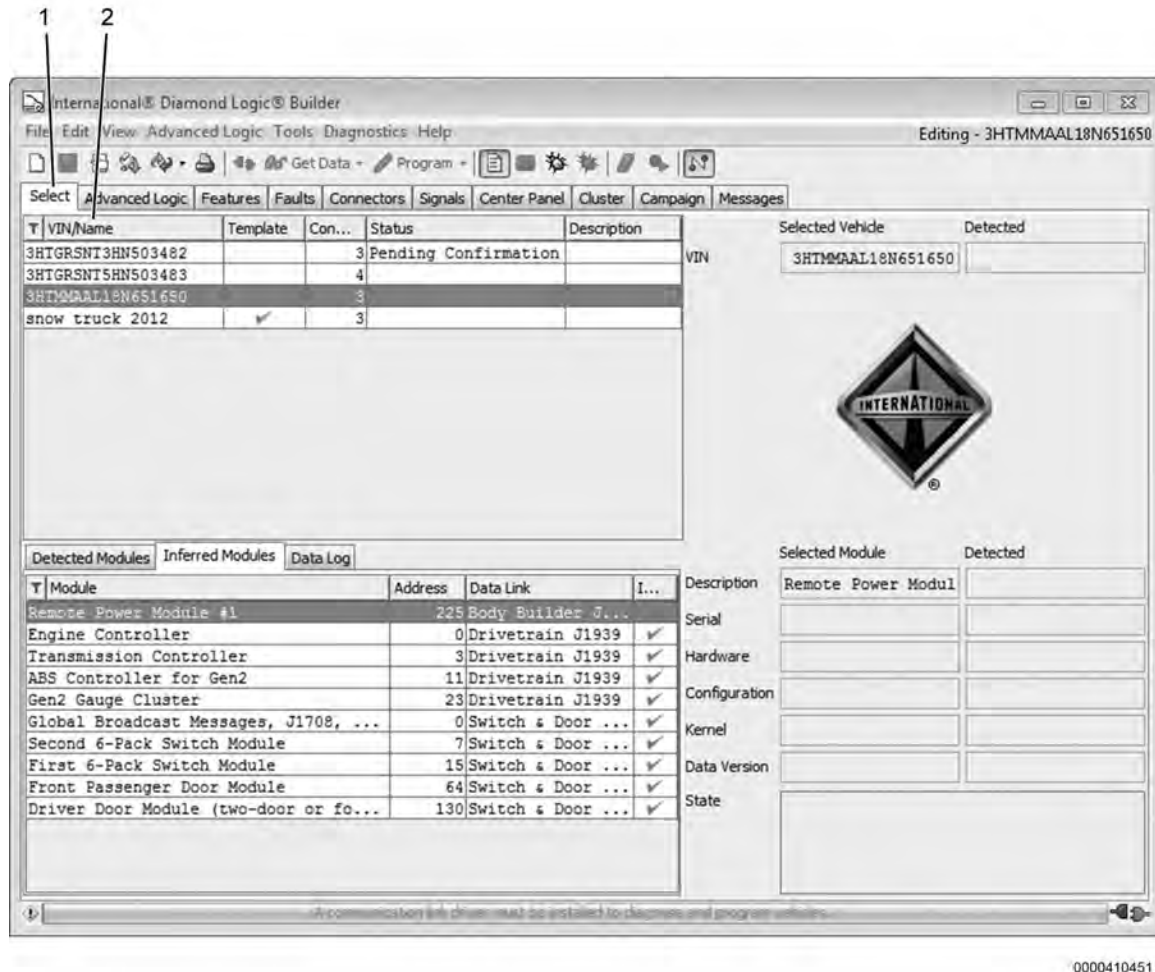
1. Column border (3)

Figure 40 Column Width

The width of columns can be changed by clicking the border between any two column headings (Figure 40, Item 1) and dragging the border to the left or right.

## SELECT TAB

The Select tab is shown by default when the program is started. This is the main page and is used to select the vehicle, to display relevant information, and to manage vehicle data. When using any of the other tabs, the user can return to this main page by using the Select tab.



**Figure 41 The Select Tab**

### Descriptions of Columns on the Upper Half of the Tab

The columns that can be displayed in the top portion of the Select tab include the following:

Column Name	Description
VIN	Vehicle Identification Number
Template	Displays the ESC / BC serial number either from History or from the installed ESC / BC, depending on the source of the VIN
Configuration Version	The number of times this VIN or template has been modified
Status	Current status of the file, for example, modified or unsaved

# TABS AND SUBTABS

Column Name	Description
Base Revision	The revision of the VIN, before the current configuration
Model	Sales model of the vehicle
Software Version	Software version tied to the file
Last Changed By	The ID of the last person to change the file
Last Changed Date	When the file was last changed

## VIN Right-Click Menu

Right-clicking a VIN will open a drop-down menu. The options in this menu can also be found in various menus of the menu bar. However, they are collected in this drop-down as a convenience to the user.

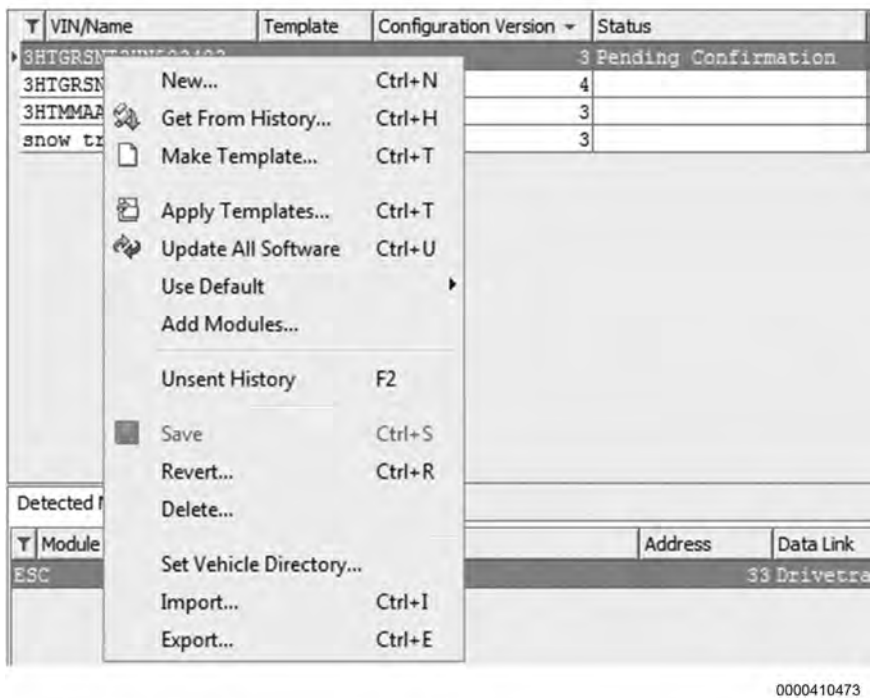
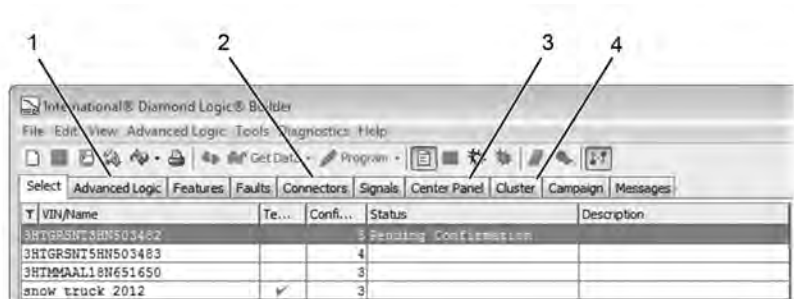


Figure 42 VIN Right-Click Menu

### Selecting a VIN



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- |                       |                     |
|-----------------------|---------------------|
| 1. Advanced Logic tab | 3. Center Panel tab |
| 2. Connectors tab     | 4. Cluster tab      |

**Figure 43 Additional Tabs Displayed When a VIN Is Selected**

Click on a listed VIN to select it. Four additional tabs are displayed when a VIN is selected (Figure 43, Items 1, 2, 3 and 4).

### The Module List

When a VIN is selected, a list of the modules programmed on the vehicle will be displayed in the bottom part of the window. When you are connected to a vehicle, this list will be displayed if the module is communicating with the ESC / BC.

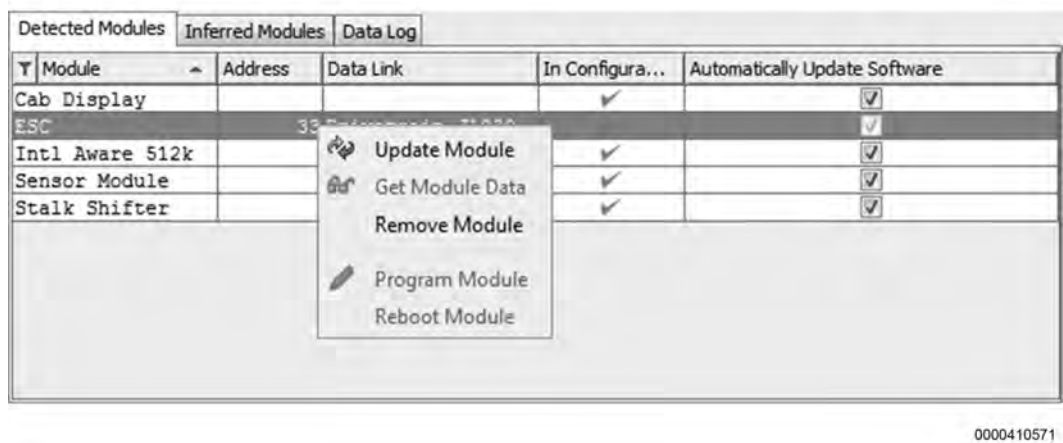
Select	Advanced Logic	Features	Faults	Connectors	Signals	Center Panel	Cluster	Campaign	M
T	VIN/Name	T...	Con...	Status	Description				
	1HTMPAFL03HPGS036			32	Diagnosing				
	3HSD2APR7HN505545			11	Pending Confirma...				
	3HTGRSNT3HN503482			3	Pending Confirma...				
	3HTGRSNT5HN503483			4					
	3HTMAAL18N651650			3					
	DLB Manual	✓		1					
	snow truck 2012	✓		3					
Detected Modules		Inferred Modules		Data Log					
T	Module	Address	~	Data Link	In Configuration				
	ESC	33	Drivetrain J1939						
	Remote Power Module #1	225	Body Builder J...		✓				
	Engine Controller	0	Drivetrain J1939		✓				
	Gauge Cluster	23	Drivetrain J1939		✓				
	Global Broadcast Messages, J170...	0	Switch & Door ...		✓				
	First 6-Pack Switch Module	15	Switch & Door ...		✓				
	Front Passenger Door Module	64	Switch & Door ...		✓				
	Driver Door Module (two-door or...	130	Switch & Door ...		✓				

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**Figure 44 The Module List**

# TABS AND SUBTABS

Right-clicking on any of the modules will open a drop-down menu that may provide additional options for that module. Options that are grayed out are not available for the selected module.



**Figure 45    Module Right-Click Menu**

The options in this menu are listed below:

Name	Description
Update Module	Updates Navistar software on the selected vehicle.
Get Module Data	Reads the selected vehicle configuration from all programmable modules.
Remove Module	Removes the selected module from this DLB session. This option does not affect the programming of the module.
Change Module Password	Changes the module password (only if the module has a password feature).
Program Module	Writes the current configuration to the selected module only.
Reboot Module	Reboots only the selected module operating program.

The Right Panel

When a VIN is selected, information about the selected vehicle populates the right side of the window. When you are connected to a vehicle, DLB will also display information about the detected ESC / BC.

	Selected Vehicle		Detected	
VIN	1HTMSAARX5J045305		1HTMSAARX5J045305	
				
	Selected Module		Detected	
Description	hitachi, CAT ESC I		Hitachi	
Serial	16058858		16058858	
Hardware	103		103	
Configuration	21		21	
Kernel	115		115	
Data Version	53		53	
State				

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Figure 46 Select Tab Right Panel

The items displayed in this area are listed in the table below:

- Selected Vehicle — Information on the vehicle currently selected.
- Detected — Information on the vehicle connected to DLB.

## TABS AND SUBTABS

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Name	Description
VIN	Vehicle Identification Number.
Description	ESC / BC processor information.
Serial	ESC / BC serial number.
Hardware	Identifies the version of the ESC / BC.
Configuration	Number of times this VIN or template has been modified.
Kernel	Identifies the release version of the core program in the ESC / BC.
Data Version	Release revision of software feature codes.
State	Displays the State of the ESC / BC (Ex: blank).

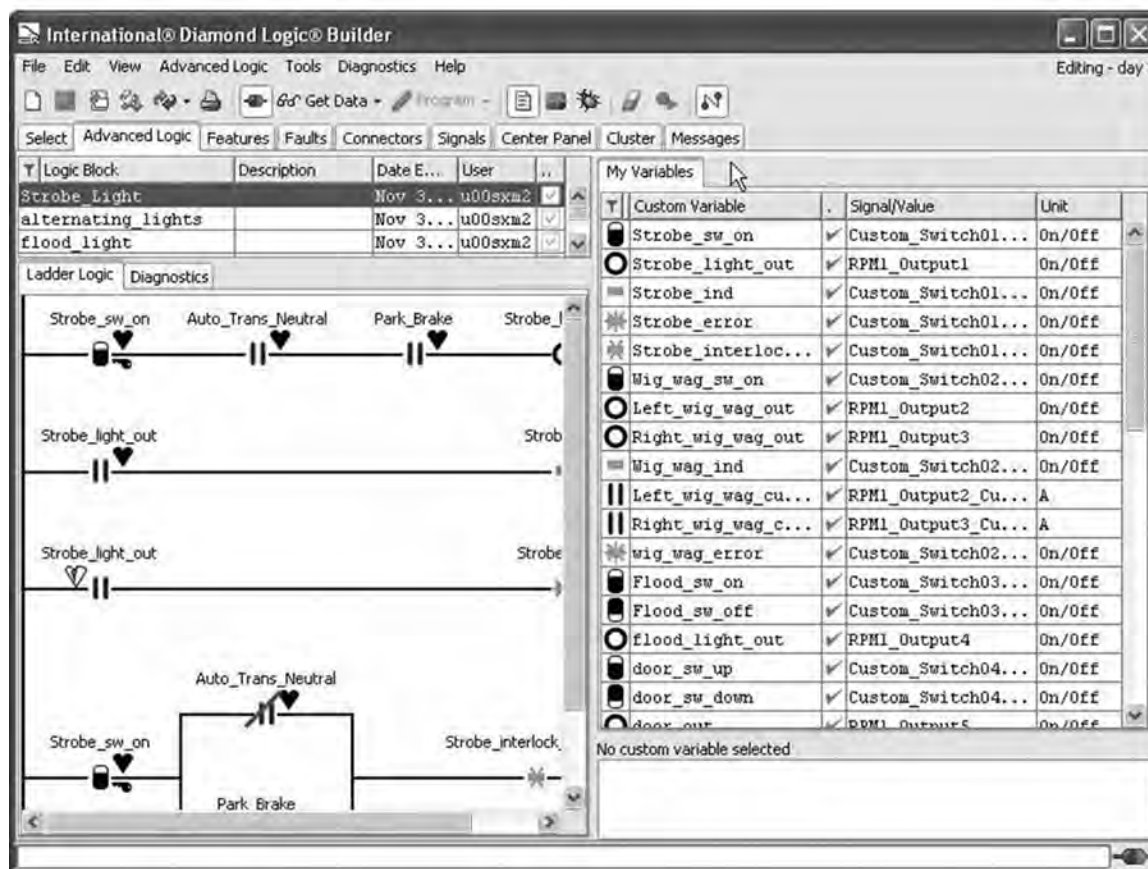


## ADVANCED LOGIC TAB

This section will describe the Advanced Logic tab and the information displays associated with it.

**NOTE – Advanced Logic programming is not available to Level II users. This capability is restricted to Level III users.**

**NOTE – There is additional information about Advanced Logic under the Help menu, and a separate manual provides more detail about Advanced Logic Programming.**



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**Figure 47 Advanced Logic Tab**

The Advanced Logic tab allows users to view logic blocks. The tab has four main parts:

- The Advanced Logic List (upper-left)
- Display area (lower-left). The figure above shows the most common display mode – Ladder Logic.
- Variable selection tabs (upper-right)
- Variable listings (lower-right)

### Advanced Logic List

This area of the Advanced Logic tab allows the user to select which logic block the user will be programming or editing and lists all logic blocks of a selected vehicle or template.

Y	Logic Block	Description	Date E...	User	..	
	Strobe Light		Nov 3...	u00sxm2	<input checked="" type="checkbox"/>	▲
	alternating_lights		Nov 3...	u00sxm2	<input checked="" type="checkbox"/>	■
	flood_light		Nov 3...	u00sxm2	<input checked="" type="checkbox"/>	▼

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**Figure 48 Advanced Logic List**

Selecting a Logic Block reveals its particular ladder logic in the display area below. Just below the Advanced Logic List is three sub tabs that allow the user to choose either the Ladder Logic view (as shown) or the Structured Logic view (for advanced programmers) and a Diagnostics tab.

**NOTE – The Diagnostics sub-tab should contain a detailed description, written by the log block creator. This should describe the operation of the logic and provide contact information. This can be very helpful if the creator provides the documentation.**

### Advanced Logic List Columns

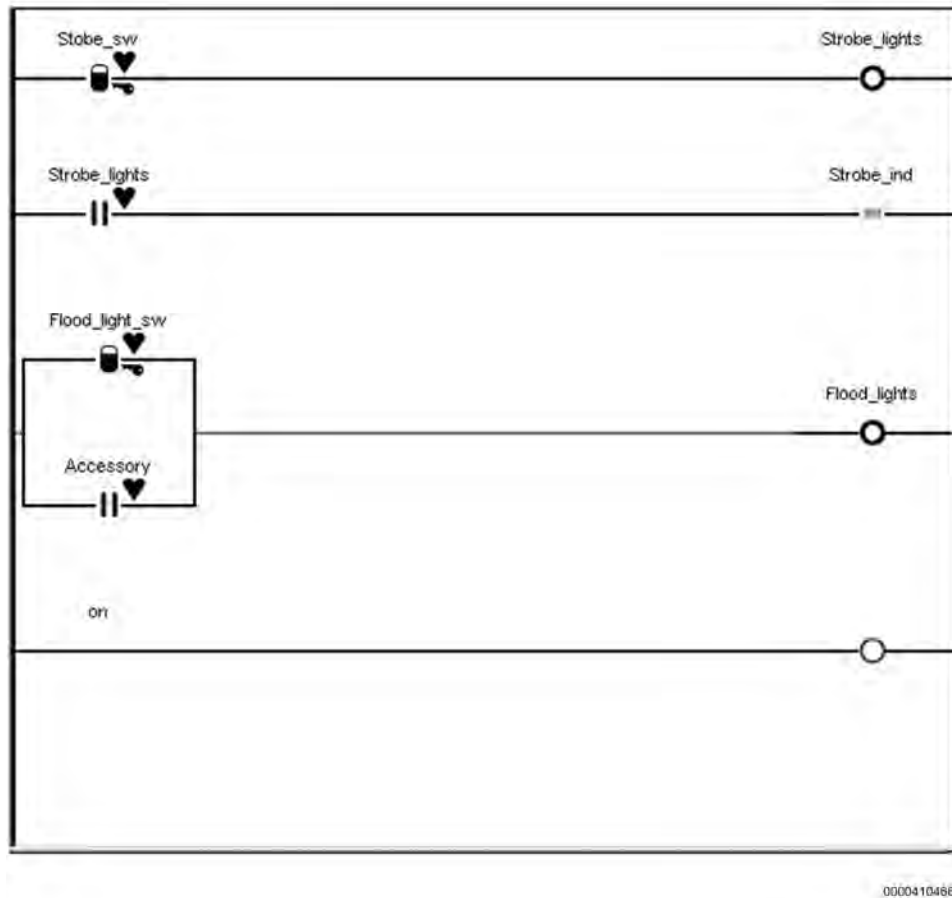
The columns in the Advanced Logic List include the following:

Name	Description
Logic Block	Logic Block filename. Logic Blocks make up the advanced logic on a vehicle. It is a way of organizing advanced programming, such as vehicle lighting in one block, PTO functions in another, emergency lighting in another.
Proprietary	Sets up a check box that allows the user to choose proprietary format.
Description	Logic Block description.
Date Edited	Date created or edited.
User	Identifies the user who last edited this Logic Block.
Active	When checked, the Logic Block is included in the vehicle configuration.

**IMPORTANT – A vehicle with Advanced Logic set to proprietary may not be easily diagnosed or serviceable by International® dealers. Diagnostic privileges are restricted to the credentials of the person who sets Logic Block as proprietary. See the Diamond Logic® Builder Software User Manual – Advanced Logic Programming (Level 3 Permissions) for more information on proprietary logic.**

## Display Area

Once an item in the logic block list is selected, the left-side display area will populate with a ladder diagram of the programmed functions. The ladder diagrams are created and may be edited in this screen, if the user has Advanced Logic permissions.



**Figure 49 Advanced Logic Display Area**

The display area itself is resizable. Using the cursor, the width of the display area can be increased or decreased. Doing so will also change the width of the other displayed areas.

## TABS AND SUBTABS

### My Variables

This area of the Advanced Logic tab allows the user to view variables used in the advanced logic programming, if there are any, on this vehicle.

Logic Blocks are built using the inputs and outputs of the associated modules in the Advanced Logic tab. Clicking and dragging these inputs and outputs to the left side of the window allows the user to build what is known as ladder logic.

<input type="radio"/> Red_Light	<input checked="" type="checkbox"/> RPM4_Output1	On/Off
<input type="radio"/> Yellow_Light	<input checked="" type="checkbox"/> RPM4_Output2	On/Off
<input type="radio"/> Green_Light	<input checked="" type="checkbox"/> RPM4_Output3	On/Off
<input type="radio"/> Dont_Walk	<input checked="" type="checkbox"/> RPM4_Output4	On/Off
<input type="radio"/> Walk	<input checked="" type="checkbox"/> RPM4_Output5	On/Off
<input type="radio"/> state	<input checked="" type="checkbox"/>	Number
<input type="checkbox"/> blink	<input checked="" type="checkbox"/>	On/Off
<input type="checkbox"/> change_timer	<input checked="" type="checkbox"/>	s
<input type="checkbox"/> win	<input type="checkbox"/>	Number
<input type="checkbox"/> t	<input checked="" type="checkbox"/>	s
<input type="checkbox"/> wait	<input type="checkbox"/>	Number
<input type="checkbox"/> base	<input type="checkbox"/>	Number
<input type="checkbox"/> speed	<input type="checkbox"/>	Number
<input type="radio"/> random	<input checked="" type="checkbox"/>	Number
<input type="radio"/> which	<input checked="" type="checkbox"/>	Number
<input type="radio"/> Rudolph	<input checked="" type="checkbox"/> RPM7_Output1	On/Off
<input type="radio"/> Dasher	<input checked="" type="checkbox"/> RPM7_Output2	On/Off
<input type="radio"/> Dancer	<input checked="" type="checkbox"/> RPM7_Output3	On/Off
<input type="radio"/> Prancer	<input checked="" type="checkbox"/> RPM7_Output4	On/Off
<input type="radio"/> Vixen	<input checked="" type="checkbox"/> RPM7_Output5	On/Off
<input type="radio"/> Comet	<input checked="" type="checkbox"/> RPM7_Output6	On/Off
<input type="radio"/> going_up	<input checked="" type="checkbox"/>	On/Off
<input type="checkbox"/> scan_time	<input checked="" type="checkbox"/>	s
<input type="radio"/> scan	<input checked="" type="checkbox"/>	Number
<input type="radio"/> kick	<input checked="" type="checkbox"/>	On/Off
<input type="radio"/> scan1	<input checked="" type="checkbox"/> RPM1_Output2	On/Off
<input type="radio"/> scan5	<input checked="" type="checkbox"/> RPM1_Output6	On/Off
<input type="radio"/> scan2	<input checked="" type="checkbox"/> RPM1_Output3	On/Off
<input type="radio"/> scan3	<input checked="" type="checkbox"/> RPM1_Output4	On/Off
<input type="radio"/> scan4	<input checked="" type="checkbox"/> RPM1_Output5	On/Off
<input type="radio"/> scan0	<input checked="" type="checkbox"/> RPM1_Output1	On/Off

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Figure 50 My Variables List

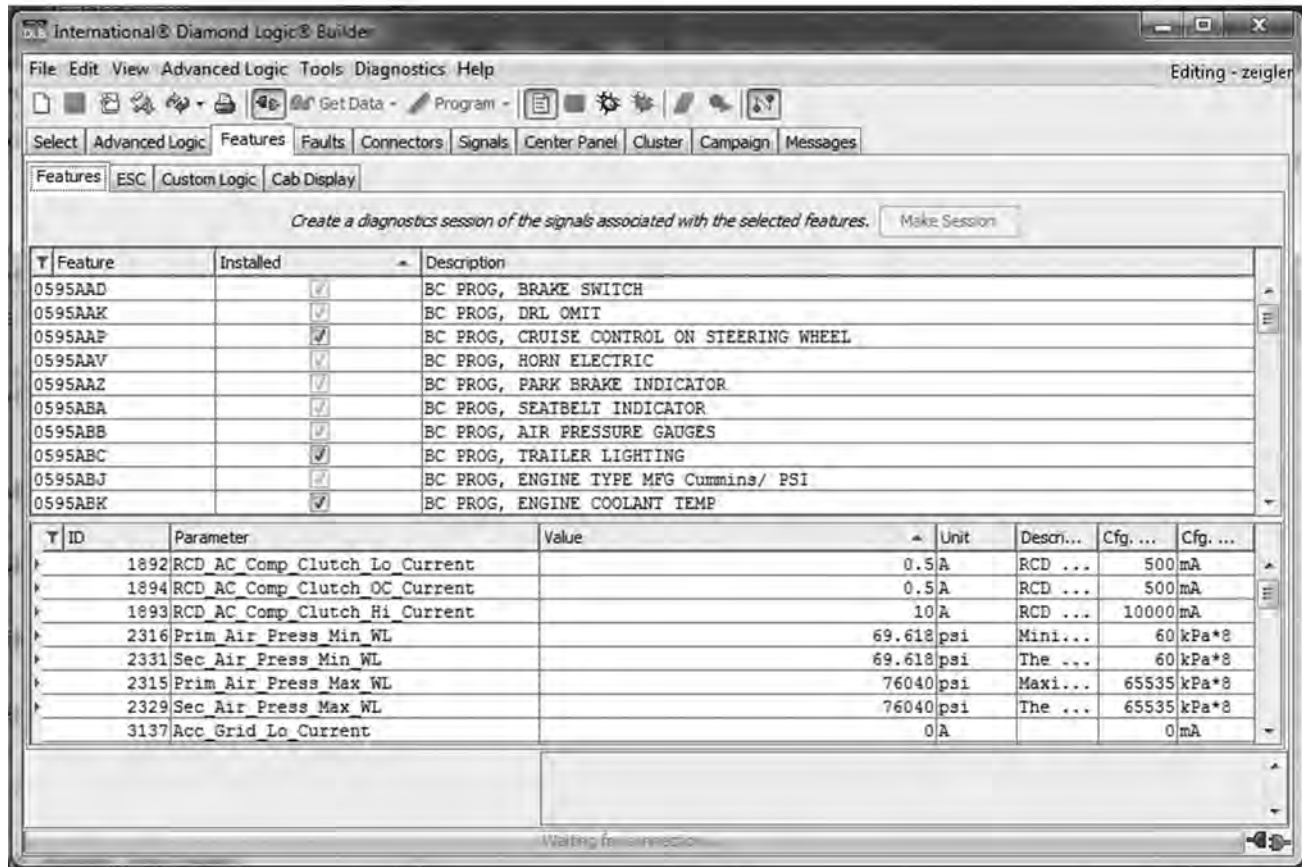
### My Variables Columns

The headings under the My Variables tab include the following:

Name	Description
Icon	Displays the variable name icon that appears in the ladder logic.
Custom Variable	Custom name the user has given to the custom variable. <b>NOTE: No spaces or symbols such as + - &amp; * # may be used.</b>
Used In	The logic block in which the custom variable is used.
Written To	Whether it is possible to write to the variable or not.
Timer	Whether the variable is a timer or not.
Semaphore	The variable can be written to; however, other internal variables may take precedence over your set variable.
Used	True when the variable is used in a logic block or the mapped signal is used on the vehicle.
Description	Custom description the user has given to the custom variable.
Signal / Value	The system name for the selected signal.
Unit	Unit of measure used to display the variable, such as seconds or On / Off.
CFG Unit	The system unit of measure for the selected variable.
Signal Description	Description for the variable. If no text is in this field, the parameter is an internal value.
Writable	Whether the user can write to this value or monitor it or use it to drive other features.
Enabled On Truck	Check if the variable is enabled and used on the truck.

## FEATURES TAB

The Features tab displays features and / or parameters for the selected vehicle.



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**Figure 51 Features Tab with Features Sub-Tab Selected**

The Features tab, which is always available, has three sub-tabs:

- **ESC:** Always available.
- **Custom Logic:** Appears when parameters have been assigned by advanced logic.
- **Cab Display:** Appears when the truck has the applicable cab display.

Features Sub-Tab

The Features sub-tab is divided into two sections:

- Available Feature list (upper section)
- Programmed Parameter list (lower section)

Additionally, a Make Session button appears at the top of the tab.

Available Features List

This list displays the features available for the selected vehicle and indicates whether each feature is currently installed.

Feature	Description	Installed
0514011	REAR AXLE SHIFT CONTROL W/AUTO TRANS	<input type="checkbox"/>
0595007	ESC PROG AIR PRESSURE W/AIR COMPRESSOR	<input type="checkbox"/>
0595008	ESC PROG AIR PRESSURE GAUGE/AIR BRAKE	<input checked="" type="checkbox"/>
0595009	ESC PROG AIR ABS WARN LIGHT & FULL POWER BRAKES, NOT TRAILER	<input checked="" type="checkbox"/>
0595011	ESC PROG TRACTION WARN LIGHT NOT TRAILER	<input type="checkbox"/>
0595012	ESC PROG TRAILER ABS W/LIGHT	<input type="checkbox"/>
0595014	ESC PROG PARK BRAKES W/IND LIGHT	<input checked="" type="checkbox"/>
0595015	ESC PROG BRAKES SWITCH	<input checked="" type="checkbox"/>
0595016	ESC PROG ENGINE EXHAUST BRAKE	<input type="checkbox"/>
0595017	ESC PROG ENGINE COMPRESS BRAKE	<input type="checkbox"/>

Figure 52 The Available Features List

The columns in this list include the following:

Name	Description
Feature	Removing the check from this item hides the Features column in the Available Features list. This column displays the features available for the selected vehicle, in numeric order.
Description	Removing the check from this item hides the Description column in the Available Features list. This column contains a brief description of each listed feature.
Installed	Removing the check from this item hides the Installed column in the Available Features list. This column indicates whether the feature is installed on the selected vehicle.

Programmed Parameter List

**NOTE – Not all features will have parameters.**

This table lists the programmed parameters for the selected vehicle's features.

ID	Parameter	Value	Unit
1887	Wipers_Hi_Current	15	A
1886	Wipers_Lo_Current	0	A
1888	Wipers_OC_Current	0	A
2171	Wipers_To_Low_Int_Enabled	<input checked="" type="checkbox"/>	On/Off
2228	Wipers_To_Low_Int_Timeout	60	s

Value  0 to 20 by 0.1 A

Windshield Wipers Low Current Detection Level (Amps)

0000410491

Figure 53 List with Numerical Parameter Selected

When a row is selected in the Programmed Parameters list, a value entry field and a description of the selected parameter appear below the list.

**NOTE – The format of the value entry field displayed will vary depending on the type of programmed parameter selected. The image above shows a parameter that accepts a numerical value within a specified range. The image below shows a simple On / Off parameter.**

ID	Parameter	Value	Unit
1887	Wipers_Hi_Current	15	A
1886	Wipers_Lo_Current	0	A
1888	Wipers_OC_Current	0	A
2171	Wipers_To_Low_Int_Enabled	<input checked="" type="checkbox"/>	On/Off
2228	Wipers_To_Low_Int_Timeout	60	s

Value ☒

This parameter is used to enable or disable the wiper speed override, if it is present.

0000410492

Figure 54 List with ON / OFF Parameter Selected

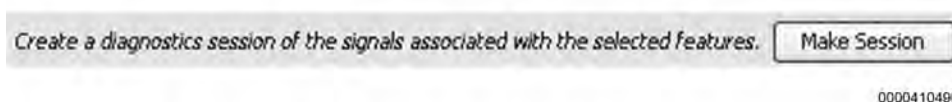


The Programmed Parameter list includes the following columns:

Name	Description
ID	Numerical label to identify the programmed parameter. Useful when speaking with Tech Central.
Parameter	Signal name for the programmed parameter.
Unit	The unit of measure for the programmed parameter.
Description	A brief description of the programmed parameter.
CFG Value	Raw data value used by the ESC / BC software. This column is normally turned off since it is of no value to the typical user.
CFG Unit	This is the unit of measure for the raw data value used by the ESC / BC software. This column is normally turned off since it is of no value to the typical user.
Set With Template	When the box in this column is checked, the programmed parameter value will be set on the vehicle when the template is applied.

### The Make Session Button

The Make Session button can be used to create a diagnostic session from the selected feature and will display the signals that are related to the feature. This is very helpful when trying to select signals to watch, while diagnosing a feature.



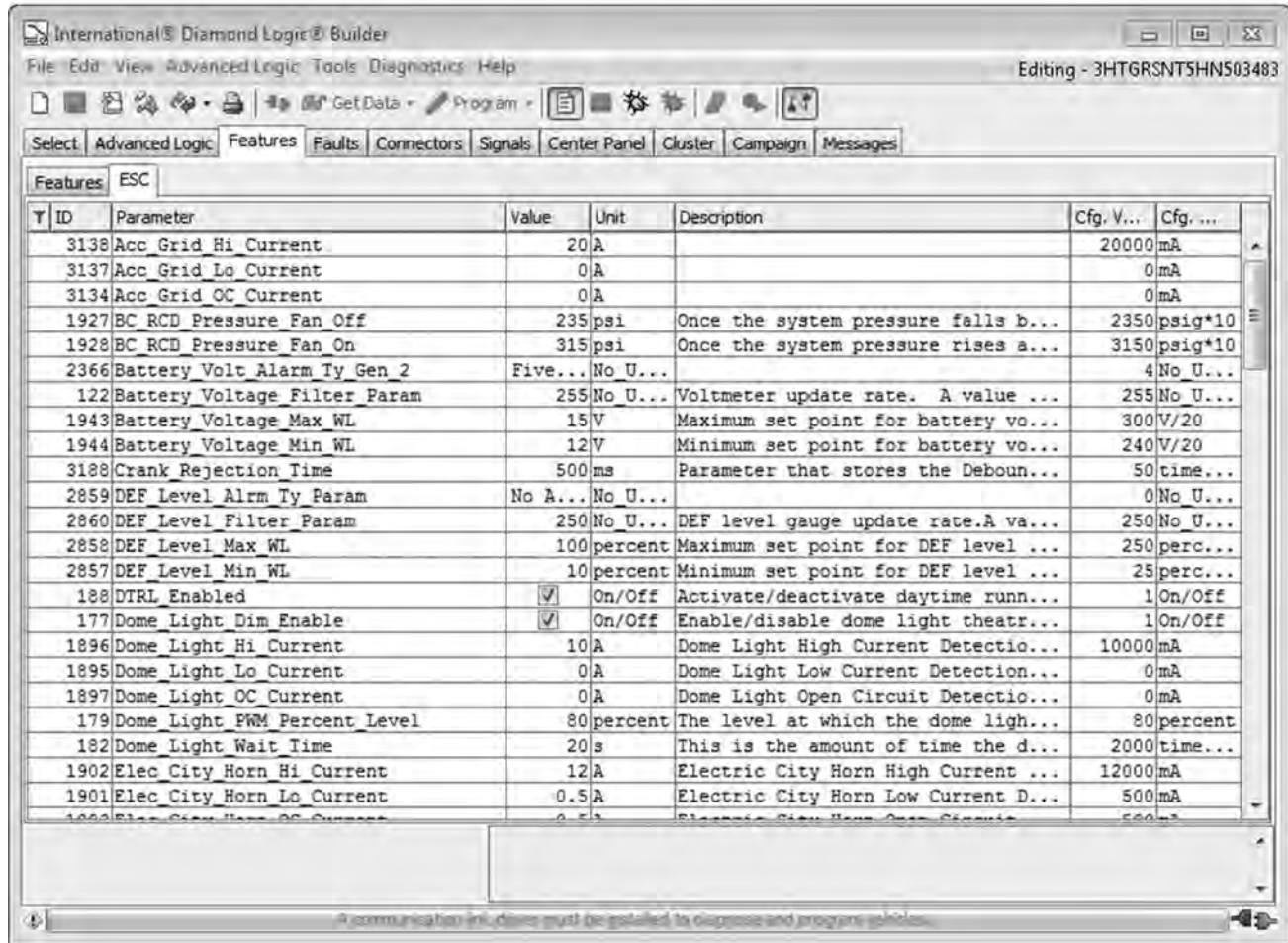
**Figure 55 Make Session Button**

Refer to the Using “Make Session” to select WATCHED Signals section. (page 181)

## TABS AND SUBTABS

### ESC Sub-Tab

The ESC sub-tab displays a list of the programmed parameters installed on the selected vehicle.



0000410482

**Figure 56 The ESC Sub-Tab**

The columns on the ESC sub-tab include the following:

Name	Description
ID	Numerical label to identify the programmed parameter. Useful when speaking with Tech Central.
Parameter	Signal name for the programmed parameter.
Unit	The unit of measure for the programmed parameter.
Description	A brief description of the programmed parameter.

---

Name	Description
CFG Value	Raw data value used by the ESC / BC software. This column is normally turned off since it is of no value to the typical user.
CFG Unit	This is the unit of measure for the raw data value used by the ESC / BC software. This column is normally turned off since it is of no value to the typical user.
Sort Matching Rows to Top	Used to find matches anywhere on the table and bring them to the top of the list.
Clear Matches	Select this item to clear any found matches and return the list to the sort order for the most recently clicked column heading.

## FAULTS TAB

The Faults tab allows the user to view and clear diagnostic codes that relate to the vehicle's body electrical system.

**NOTE – The user must be in Diagnostic Mode with Key ON, Engine OFF for diagnostic trouble codes to be displayed.**



**Figure 57 Diagnostic Mode Icon**

Enter Diagnostic Mode by clicking the Diagnostic Mode icon in the toolbar while you are connected to and communicating with the vehicle.

Once connected to a vehicle, with the key in ignition or run position, engine not running, the Faults tab will display any available faults. However, DLB will display some engine-related diagnostic trouble codes.

Select	Advanced Logic	Features	Faults	Connectors	Signals	Center Panel	Cluster	Messages		
T	SPN	FMI	Byte 7	Byte 8	Active	OC	Message		Probable Cause	Module
	639	14	228	254	✓		1 Failed to receive PGN 65252.			Body Cont...
	612	14	25	2	✓		1 Analog channel 25 is out of range high.		Shorted h...	Body Cont...
	625	14	130	0	✓		1 Driver Door Module (two-door or four-door) (address 130)...			Driver Do...
	625	14	64	0	✓		1 Front Passenger Door Module (address 64) not communicati...			Front Pas...
	613	14	1	5	✓		1 HVAC Control Head diagnostic circuit loss of communicati...			Body Cont...
	639	14	255	254	✓		1 Failed to receive PGN 65279.			Body Cont...
	639	14	192	254	✓		1 Failed to receive PGN 65216.			Body Cont...
	612	14	2	2	✓		1 Analog channel 2 is out of range high.		Shorted h...	Body Cont...
	612	14	30	2	✓		1 Analog channel 30 is out of range high.		Shorted h...	Body Cont...

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**Figure 58 The Faults Tab**

The columns on this tab are described below:

Name	Description
SPN	Suspect Parameter Number: Number that indicates the Major System that is experiencing a failure mode.
FMI	FMI is a number for "Fault Mode Indicator." Currently this value is always 14 for "Indeterminate" as per the SAE J1939 specification. The FMI for the Diamond Logic® electrical system is currently displayed under the Byte 8 column listed below.
Byte 7	Number that indicates the sub-system that is experiencing a failure mode.
Byte 8	Number to describe the detailed fault mode such as open circuit or shorted to ground.
Active	Indicator to show whether a fault is currently active or inactive.
OC	Occurrence Count: Number of times a fault has gone active and then inactive.
Message	Text description of the numerical fault code.

---

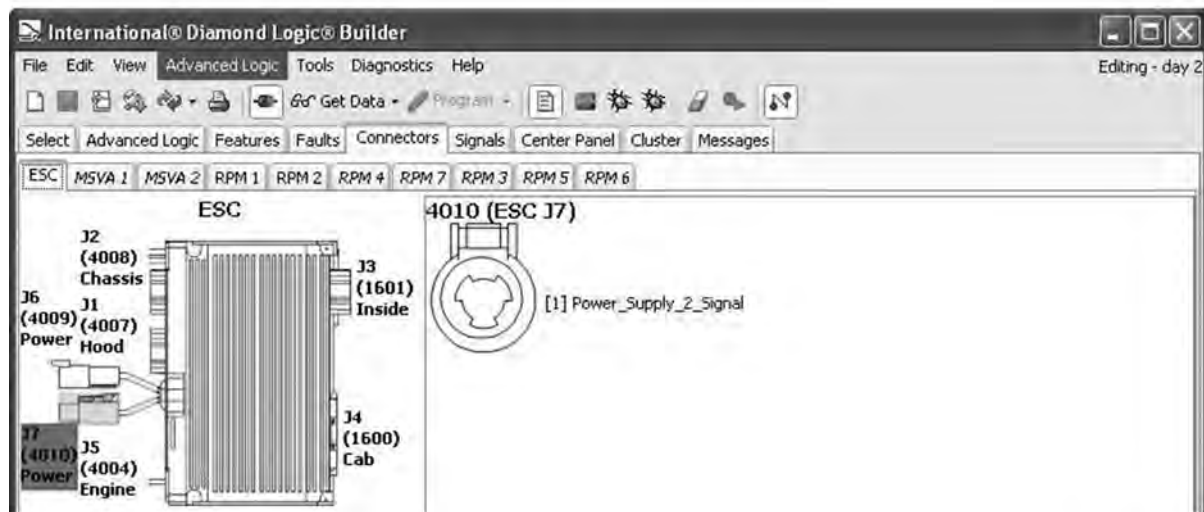
Name	Description
Comment	Explanation of Message Description.
Probable Cause	Probable cause of the fault.
Pins	Module pin and connector associated with the fault code, if applicable.
Module	Text name of module associated with the fault code, if applicable.
Address	Text name of module associated with the fault code, if applicable. Address of the module logging the fault. Currently, this number is always 33 for the ESC / BC. Recommend turning this column off, leaving more space for other columns, until later enhancements provide more varied data.

**NOTE – The SPN, FMI, Byte 7, and Byte 8 columns together make up the diagnostic trouble code. All four of these columns should remain selected.**

### CONNECTORS TAB

The Connectors tab allows the user to view modules programmed for the selected vehicle. The sub-tabs under the Connectors tab are used to select a module to view.

**NOTE – A different view for the BCM will be displayed, depending on the model of the vehicle.**



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**Figure 59 Connectors Tab Showing Electronic System Controller**

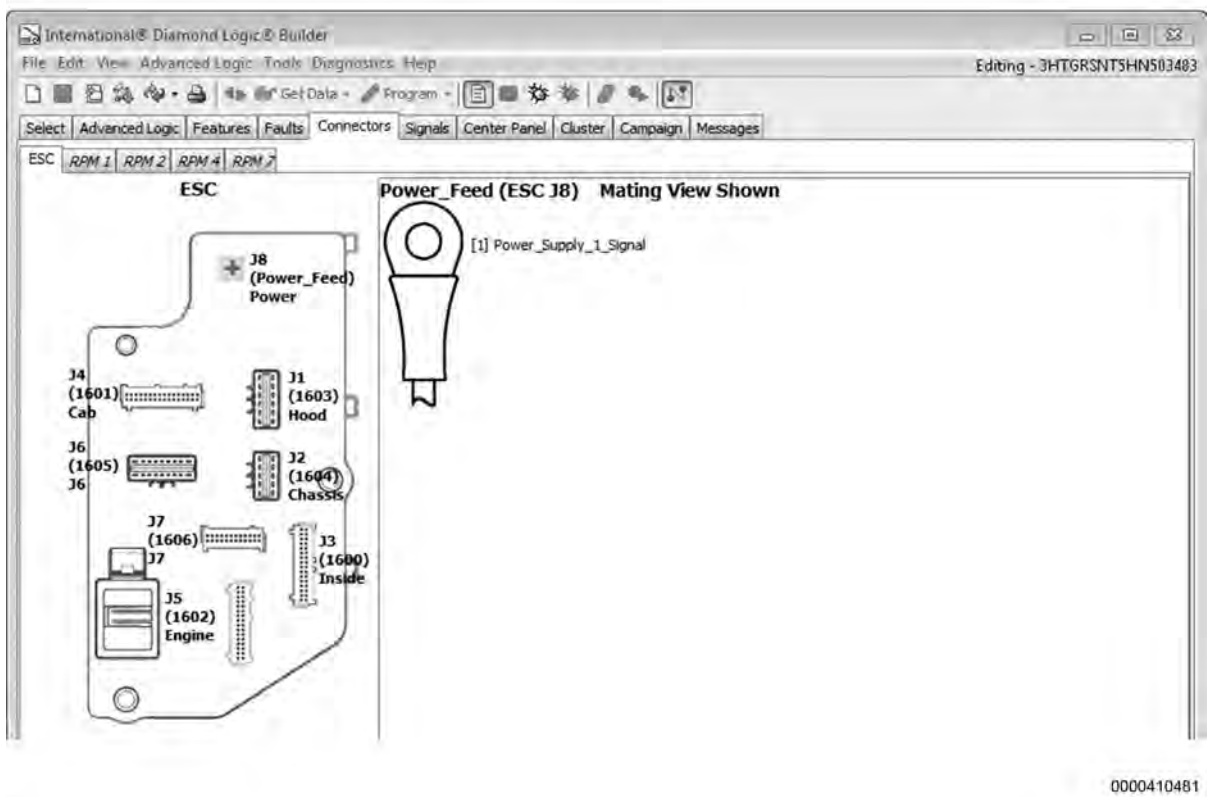


Figure 60 Connectors Tab Showing Generation 4 Body Controller

## TABS AND SUBTABS

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### Connectors Tab Modules

Each sub-tab under the Connectors tab represents a particular module. If the sub-tab's name is italicized, the module is inactive / not configured.



**Figure 61 Module Sub-Tabs**

The sub-tabs are named as follows:

Name	Description
ESC	Electronic System Controller
MSVA 1	Modular Solenoid Value Assembly 1
MSVA 2	Modular Solenoid Value Assembly 2
RPM X	Remote Power Module X

**NOTE –** Some selected VINs may not display anything other than the ESC, depending on the model of the vehicle.



## Module Not Configured

In the figure below, the name of the RPM 2 tab is italicized, indicating it that the RPM 2 module is not configured. When the tab is selected, it displays the RPM 2 module and its connectors. There are no labels associated with connectors that are not being used.

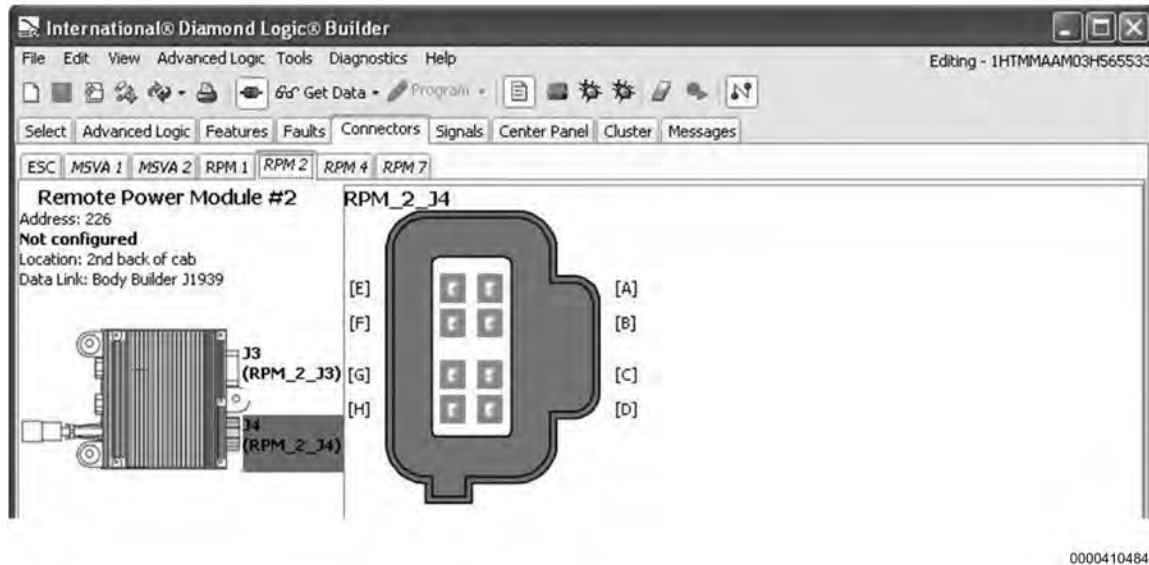


Figure 62 Module Not Configured

Configured Module

In the figure below, the name of the RPM 1 tab is STANDARD FONT, indicating that the RPM 1 module is configured. When the tab is selected, it displays the RPM 1 module and its connectors.

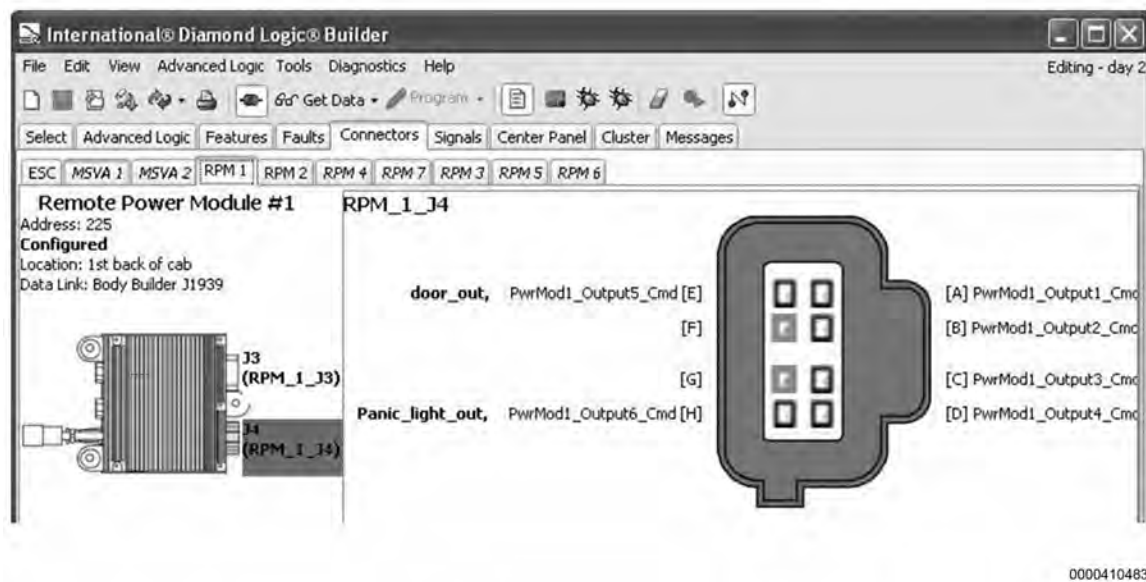
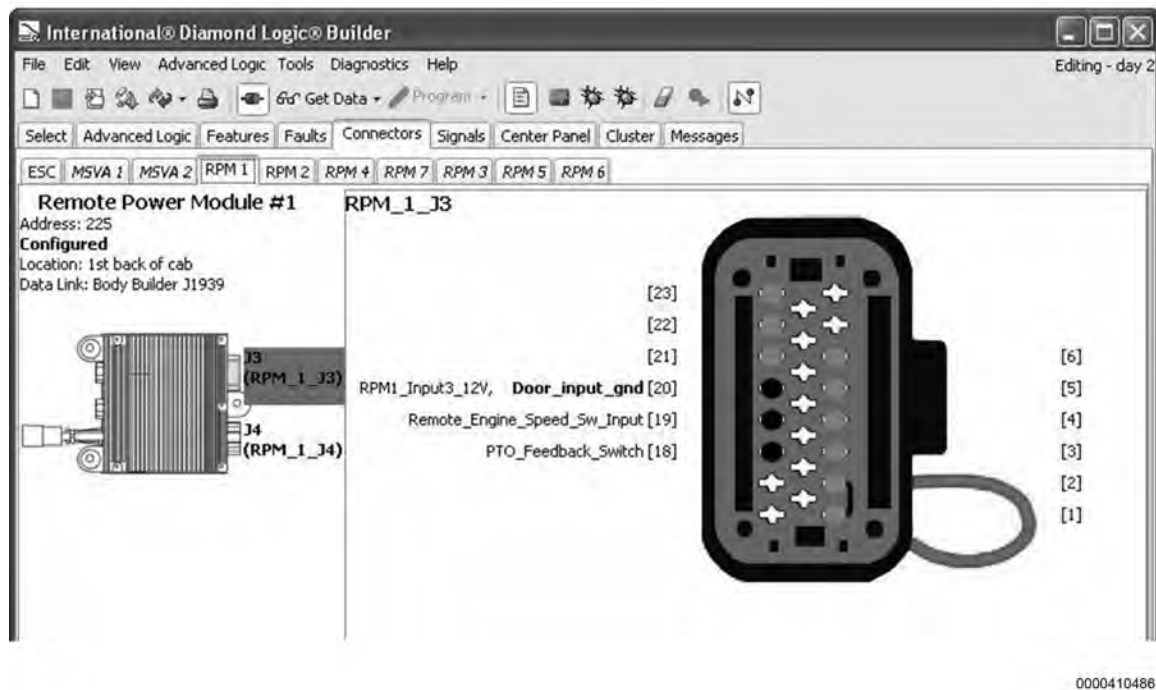


Figure 63 Configured Module

The connector pin-outs that are used are labeled with the signals associated with that pin. The outside signal names are internal signals used by the system processor. Other signal names are provided for usage by the Advanced Logic user. General-purpose names are applied to signals that have not been used by Advanced Logic. Those signals that are in bold have been used in Advanced Logic features.

## Selecting a Connector

When a module connector is selected, the connector in the module view changes to a dark gray color. The newly selected connector and pin-out information appears in the right-side pane.



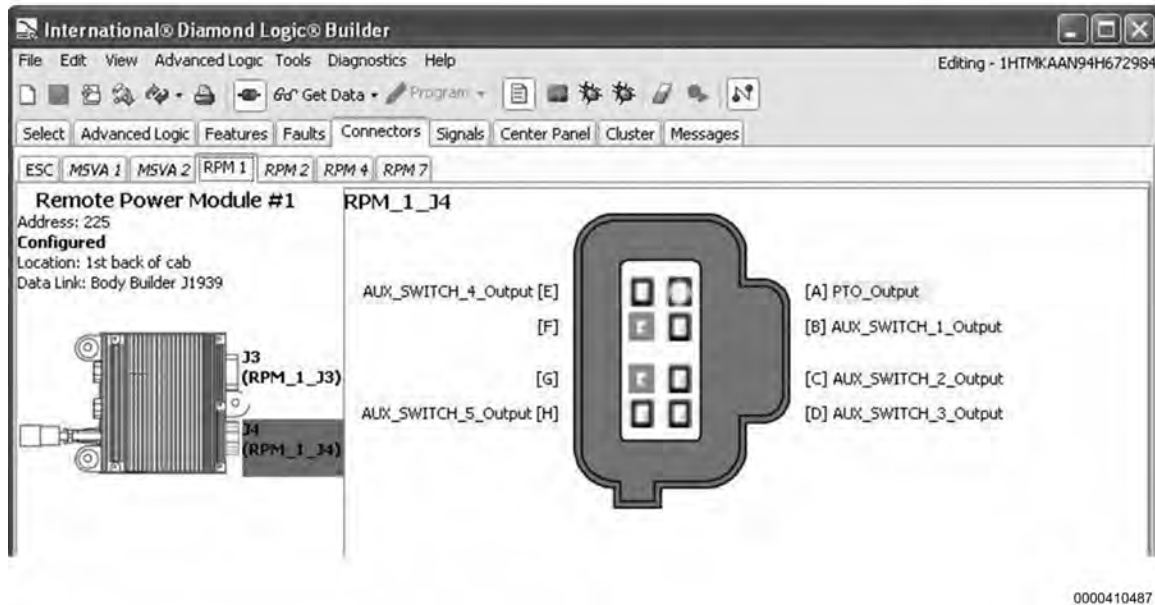
**Figure 64 Selecting a Connector**

If the connector data is wider than the space provided, horizontal scroll bars will be displayed to allow the user to scroll left and right.

**NOTE –** The location of the input signal determines whether it is ground or 12V active. For example in the figure above, pin 20 is a ground active signal. If it was 12V active, the bold print would be on the left and RPM1\_Input3\_GND would be listed on the right in lower case.

### Selecting a Connector Pin

Hovering over the pin with the mouse pointer will cause a brief description of the pin's function to appear.



**Figure 65 Selecting a Connector Pin**

When connected to a vehicle and DLB is in Diagnostic Mode, the user can lock on an output connector pin command in the connector view. When a connector pin label is selected, the Module tab, connector pin, pin label, and pictured module connector are all highlighted in yellow. Selecting the Signals tab will then display the highlighted signal for additional information. In the sample figure below, PTO\_Output has been selected.

### Signals Tab View of Selected Pin

When a pin is selected, selecting the Signals tab will show the selected pin signal description and details, if the applicable signal is available in the list of signals selected. Select the ESC Signals sub-tab to see all signals that apply to this vehicle.

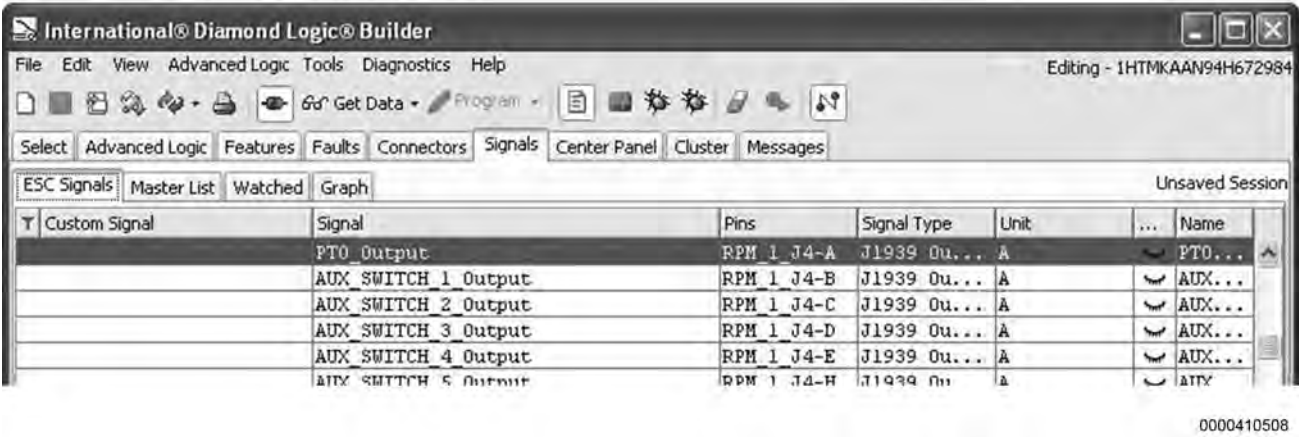


Figure 66 Signals Tab View of Selected Pin

### Selecting Multiple Pin Signals

To select more than one pin, hold down the Control key and then click the desired pins.

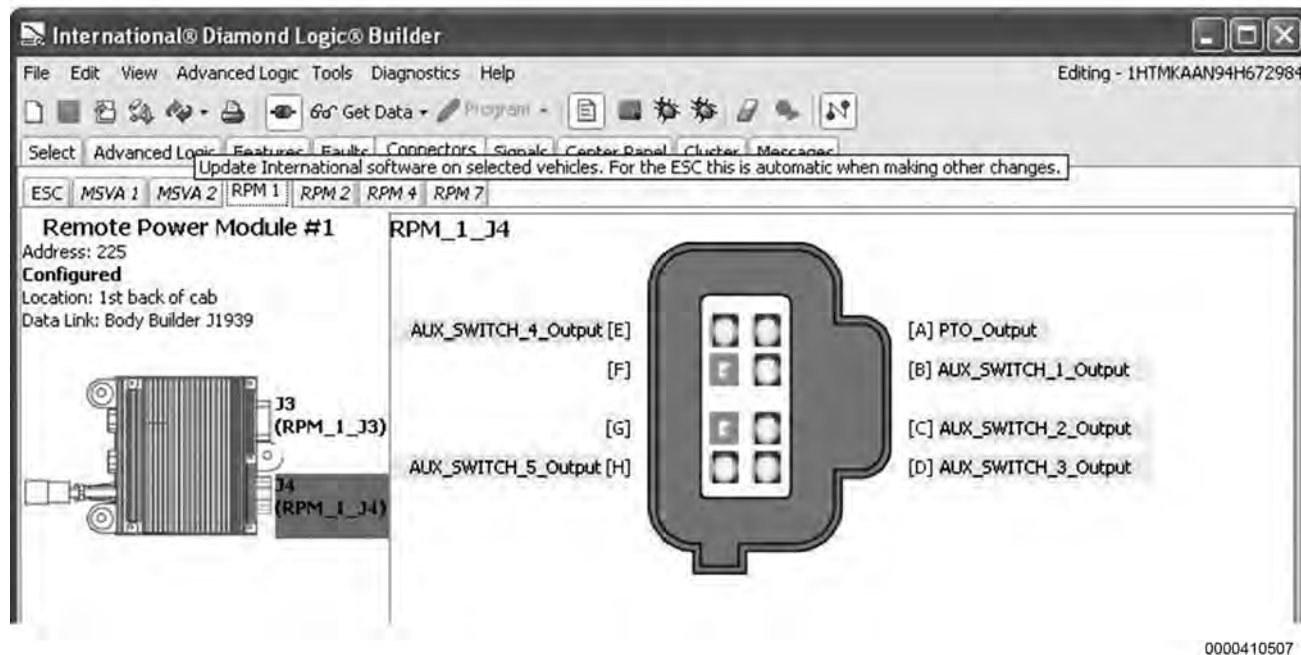


Figure 67 Multiple Pins Selected

### Deselecting a Pin

To deselect a pin, hold down the Control key and then click on pin to deselect.

Selecting a Pin Used in Advanced Logic

A pin used in Advanced Logic can be selected by clicking on the pin itself, on the pin command text, or on the pin request text. The text, the pin, and the Module tab will then all be highlighted in yellow.

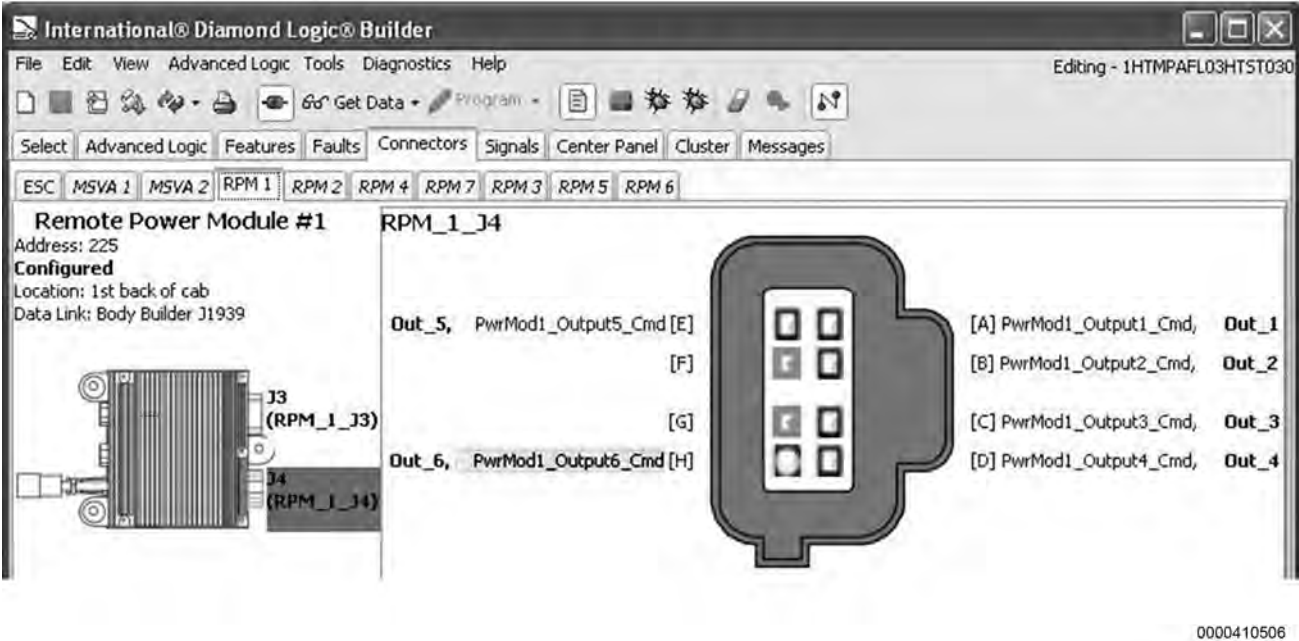
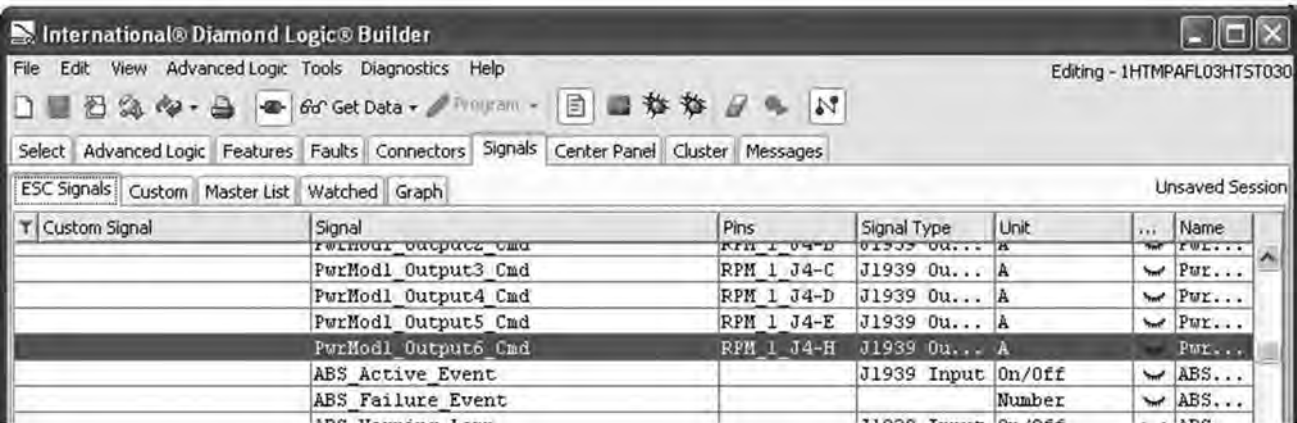


Figure 68 Selecting a Pin Used in Advanced Logic

# TABS AND SUBTABS

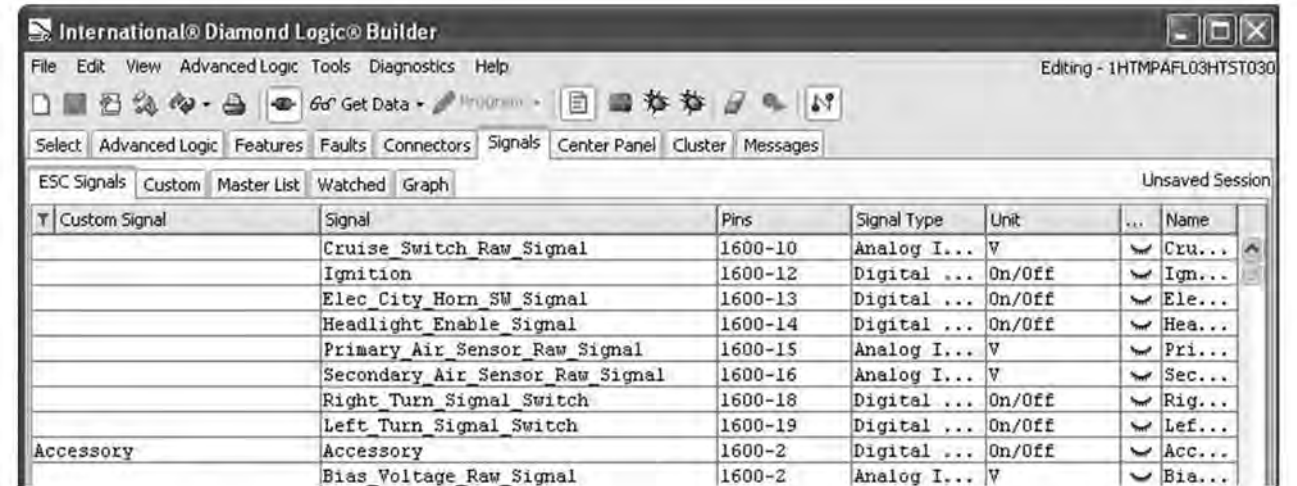
Selecting the Signals tab will then show the selected pin signal description and details.

**NOTE – The signal highlighted will depend on where the user clicks. For example, clicking the pin itself or the pin name text will highlight the output request signal. Clicking the command text will highlight the output command signal. See figures below.**



0000410510

Figure 69 Signal View When the Output Pin or Pin Name Is Clicked



0000410509

Figure 70 Signal View When the Output Pin Command Is Clicked



To unselect an output pin, hold down the Control key and then click on the pin to be deselected. Alternately, the user can click on another VIN or template.

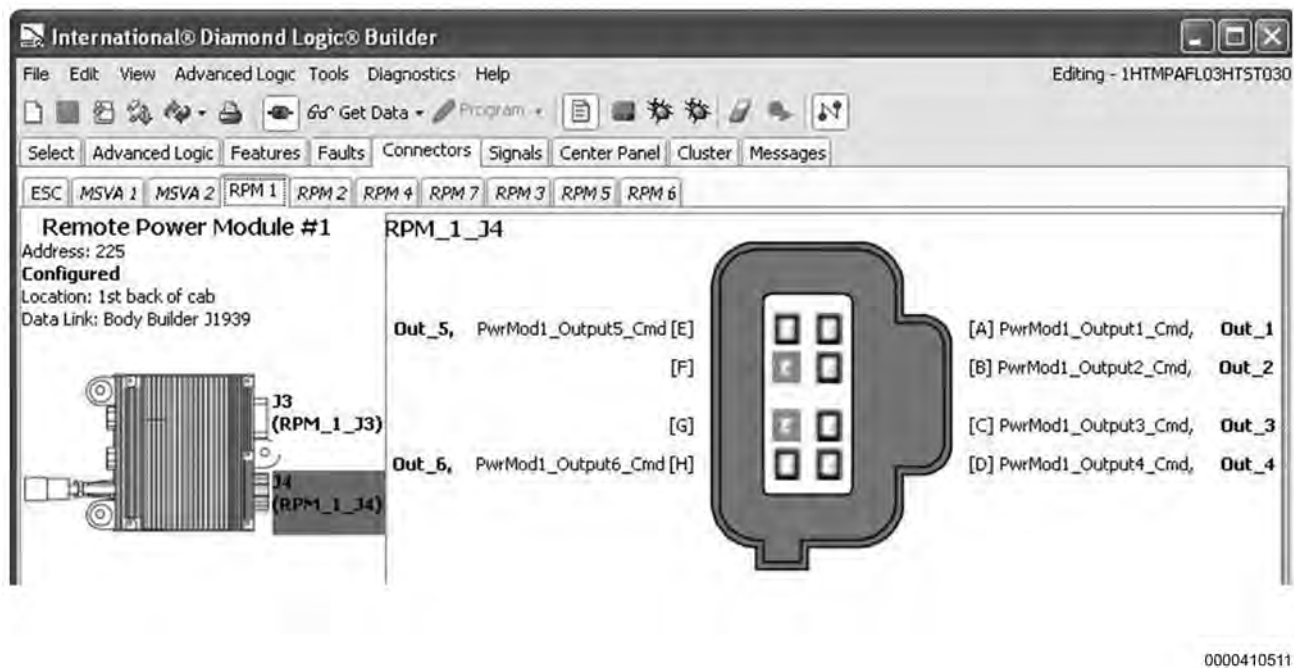


Figure 71 No Pins Selected

These functions apply to the ESC and Air Solenoid Module views as well.

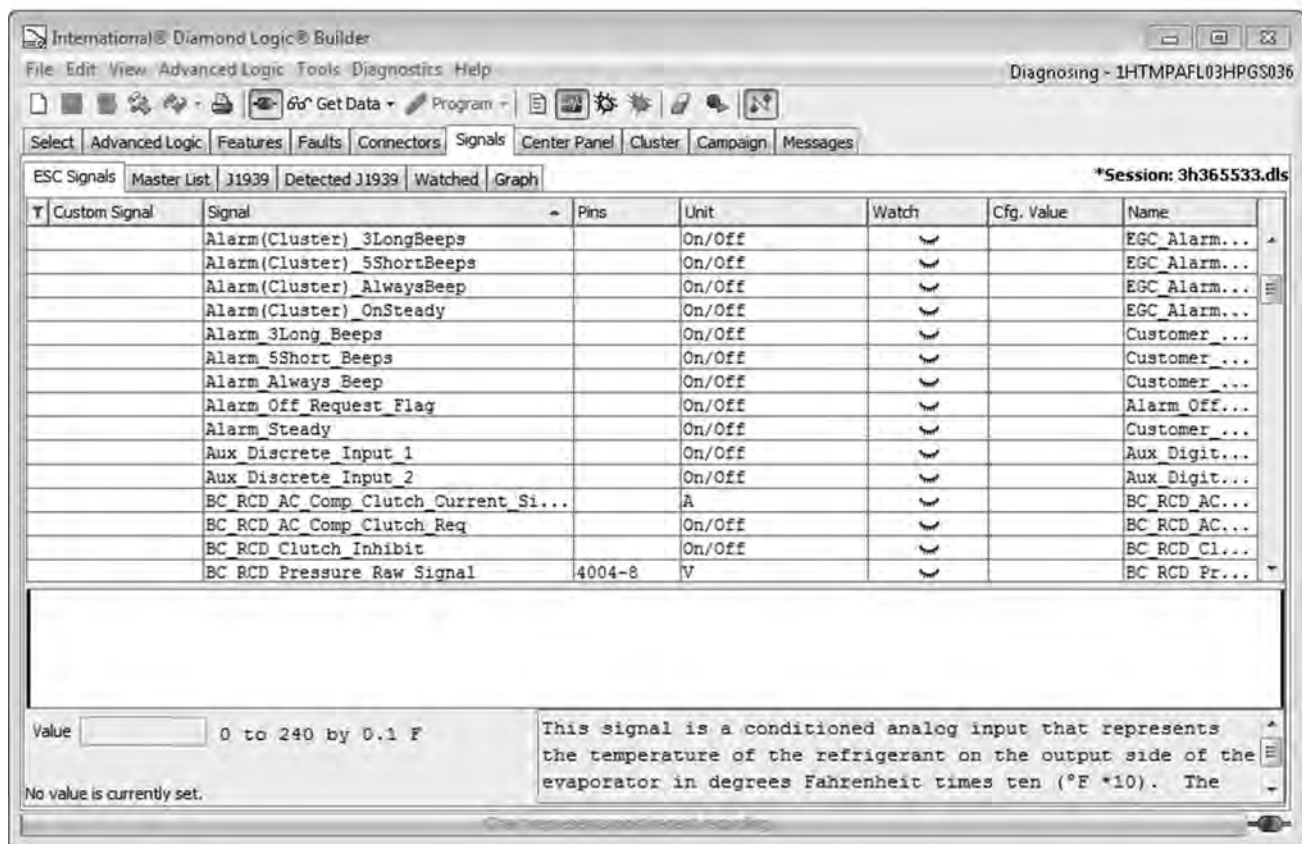
## TABS AND SUBTABS

### SIGNALS TAB

The Signals tab allows the user to view detailed information about each electrical signal that is available for use by Navistar engineered features and by Advanced Logic, if applicable.

Several sub-tabs are displayed when the Signals tab when it is selected. Among others, these typically include ESC Signals, Master List, Watched, and Graph.

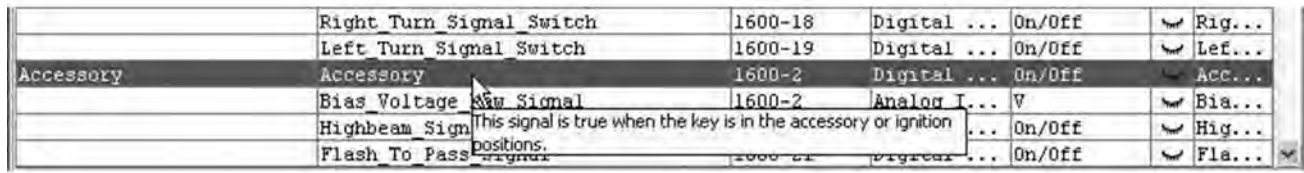
The upper section each sub-tab (except Graph) displays a list of signals associated with the selected vehicle. The lower section displays, if applicable, associated ladder logic as it pertains to the selected signal from the upper section.



0000413556

Figure 72 The Signals Tab

Notice that in the figure below, a help message is displayed. Throughout the DLB program, hovering the cursor over an item can display help popups such as this one.



	Right Turn Signal Switch	1600-18	Digital ...	On/Off	⌵	Rig...
	Left Turn Signal Switch	1600-19	Digital ...	On/Off	⌵	Lef...
Accessory	Accessory	1600-2	Digital ...	On/Off	⌵	Acc...
	Bias Voltage	1600-2	Analog I...	V	⌵	Bia...
	Highbeam Signal			On/Off	⌵	Hig...
	Flash To Pass		Digital ...	On/Off	⌵	Fla...

0000410513

**Figure 73 Mouse Hover Help Message**

### Signals Tab Columns

With the exception of the Graph sub-tab, all of the sub-tabs on the Signal tab present data in a tabular format. All of these tables have the same column headings:

Name	Description
Custom Signal	Displays the custom signal name assigned by the Diamond Logic® Builder software user.
Signal	Displays internal system name for each signal.
Pins	Displays internal system name for each signal.
Signal Type	Displays, if applicable, generated signal type such as analog, digital, J1939, or 1708.
Physical Signal	Name of the signal used by the system controller. This column would normally not be displayed since it is of no use to the Diamond Logic® Builder software user.
Index	Entry in the electrical system data table. This column would normally not be displayed since it is of no use to the Diamond Logic® Builder software user.
Description	Displays the logic description.
Unit	Unit in which the variable is displayed, such as seconds or On / Off.
Watch	Displays the watched / not watched selection icon.
Cfg. Unit	The unit of the raw data value used by the system. This column would normally not be displayed since it is of no use to the Diamond Logic® Builder software user.
Name	Displays the signal name.

## TABS AND SUBTABS

### ESC Signals Sub-Tab

All signals programmed into the selected VIN will be displayed on this tab.

Select	Advanced Logic	Features	Faults	Connectors	Signals	Center Panel	Cluster	Messages
ESC Signals	Custom	Master List	Watched	Graph	Unsaved Session			
Custom Signal	Signal	Pins	Signal Type	Unit	...			
	Cruise Switch Raw Signal	1600-10	Analog Input	V				
	Ignition	1600-12	Digital I...	On/Off				
	Elec City Horn SW Signal	1600-13	Digital I...	On/Off				
	Headlight Enable Signal	1600-14	Digital I...	On/Off				
	Primary Air Sensor Raw Signal	1600-15	Analog Input	V				
	Secondary Air Sensor Raw Signal	1600-16	Analog Input	V				
	Right Turn Signal Switch	1600-18	Digital I...	On/Off				
	Left Turn Signal Switch	1600-19	Digital I...	On/Off				
Accessory	Accessory	1600-2	Digital I...	On/Off				
	Bias Voltage Raw Signal	1600-2	Analog Input	V				
	Highbeam Signal	1600-20	Digital I...	On/Off				
	Flash To Pass Signal	1600-21	Digital I...	On/Off				
	Wiper 0 Signal	1600-22	Digital I...	On/Off				
	Wiper 1 Signal	1600-23	Digital I...	On/Off				
	Wiper 2 Signal	1600-24	Digital I...	On/Off				
	Door Switch	1600-25	Digital I...	On/Off				
	Switched 5V Sense Raw Signal	1600-27,4...	Analog Input	V				
	Washer Pump Signal	1600-28	Digital I...	On/Off				
	Park Brake Switch Signal	1600-32	Digital I...	On/Off				
	Brake Analog Switch Raw Signal	1600-33,4...	Analog Input	V				

0000410512

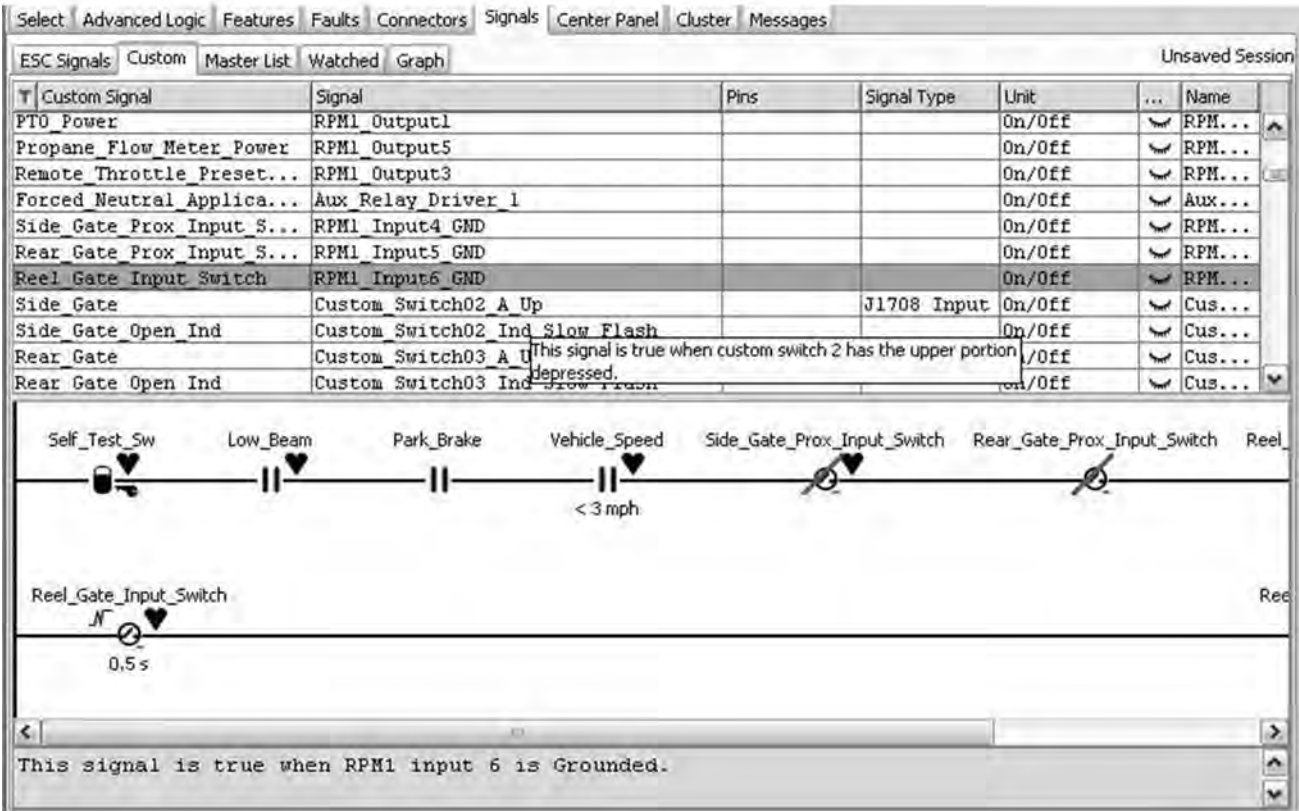
**Figure 74 ESC Signals Sub-Tab**

Custom Signals Sub-Tab

This tab displays all Advanced Logic signals used.

**NOTE – This tab is displayed only when a VIN has Advanced Logic applied to it.**

When the Reel\_Gate\_Input\_Switch signal is highlighted, the lower portion of the window populates with the corresponding Advanced Logic for the selected signal.



0000410523

Figure 75 Custom Sub-Tab

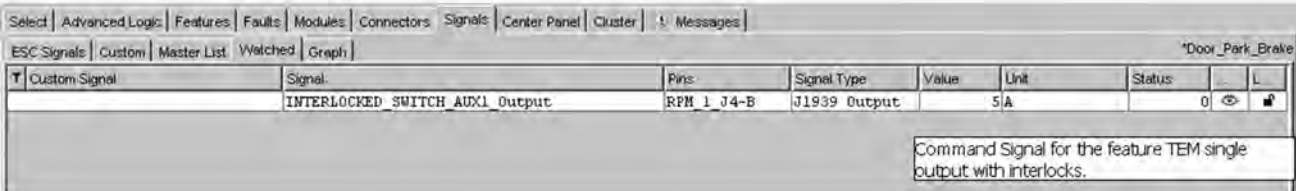
Master List Sub-Tab

The Master List sub-tab displays all signals that could be programmed to a VIN. This tab will also display the Advanced Logic corresponding to the selected signal.

## TABS AND SUBTABS

### Watched Sub-Tab

The Watched Tab shows signals that have been selected to be monitored as a result of clicking the “Make Session” button, by selecting a saved session or by selecting signals while viewing other tabs.



The screenshot shows the 'Watched' sub-tab in a software interface. The top menu bar includes 'Select', 'Advanced Logic', 'Features', 'Faults', 'Modules', 'Connectors', 'Signals', 'Center Panel', 'Cluster', and 'Messages'. Below this, a sub-menu bar shows 'ESC Signals', 'Custom', 'Master List', 'Watched', and 'Graph'. The 'Watched' sub-tab is active. A table displays the following data:

Custom Signal	Signal	Pins	Signal Type	Value	Unit	Status	L
	INTERLOCKED_SWITCH_AUX1_Output	RPM_1 J4-B	J1939 Output	5	A	0	

Below the table, a text box states: "Command Signal for the feature TEM single output with interlocks."

0000410526

**Figure 76 Interlocked Switch Signal – Switch On**

Signals to be watched can also be selected from the master or customer signal list. This is done by highlighting the desired signal and clicking the eye icon. In the figure above, the Interlocked Switch signal has been selected. Here, the signal output indicates 5 amps. The figure below, however, shows the same signal with the Interlocked Switch in the center panel Off. Notice that the signal output is now zero.



The screenshot shows the same 'Watched' sub-tab interface as Figure 76, but the signal value has changed to 0A.

Custom Signal	Signal	Pins	Signal Type	Value	Unit	Status	L
	INTERLOCKED_SWITCH_AUX1_Output	RPM_1 J4-B	J1939 Output	0	A	0	

Below the table, a text box states: "Command Signal for the feature TEM single output with interlocks."

0000410527

**Figure 77 Interlocked Switch Signal – Switch Off**

### Graph Sub-Tab

While in Diagnostic Mode, the Graph sub-tab allows you to view signals that are being “watched” in a graphical format.

These graphs can be saved for future review.

**NOTE – The graphing feature is seldom used as there are other places, connector views, and signal views where you can watch signal interaction. Setting, arming and using triggers to start and stop graphs requires some practice.**

To select the signals to be graphed, open the ESC Signals tab and click the eyelid icon for each desired signal. The icon will change to an open eye for signals that have been selected.

Select only the required signals. Viewing too many signals on a graph will make it difficult to distinguish between them. If it is necessary to deselect a signal, simply click the open eye icon.



**Figure 78 Record Icon (Select Trigger)**

When selecting the Graph sub-tab, the graph will not be displayed until a trigger is selected and activated or the Record Button in the toolbar is clicked to arm / disarm the trigger.

Setting a Trigger

To configure a trigger:

- 1. In the menu bar, select Diagnostics > Edit Triggers. The Edit Triggers window appears. This is where the user can select which signal will start the graph in the session.



Figure 79 Edit Triggers: Signal Source Drop-Down

- 2. In the Signal Source drop-down (upper left corner of the Edit Triggers window), select the source of the desired signal. For example, if you want to use a signal that is listed on the Watched sub-tab, select Watched.

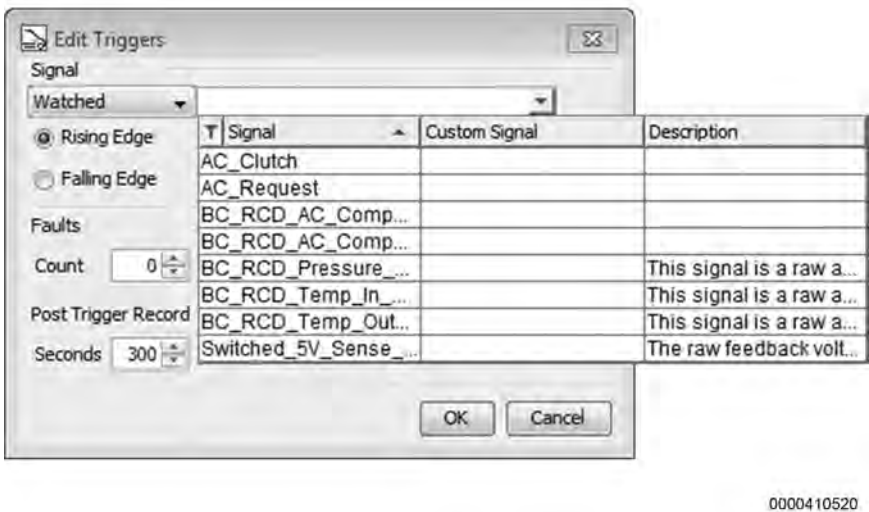
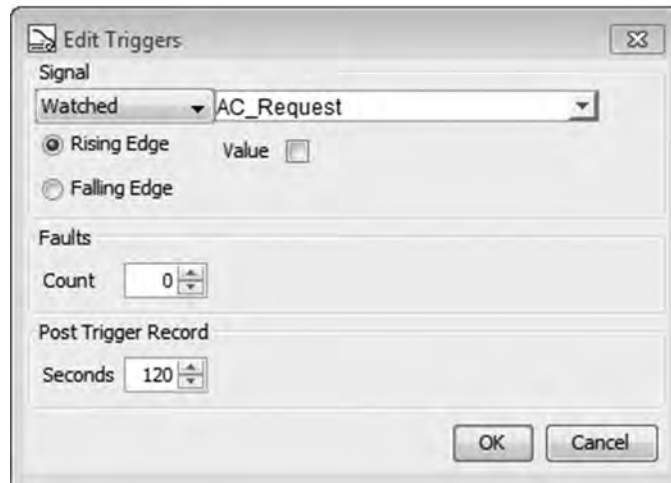


Figure 80 Edit Triggers: List of Signals



3. In the drop-down immediately to the right of the one modified in the previous step, select the specific signal to use as a trigger.

**NOTE – This drop-down lists all the signals from the specified source. So, if Watched had been selected in the previous step, it would list all of the signals that appear on the Watched sub-tab (in other words, all signals that the user has chosen to watch).**



0000410521

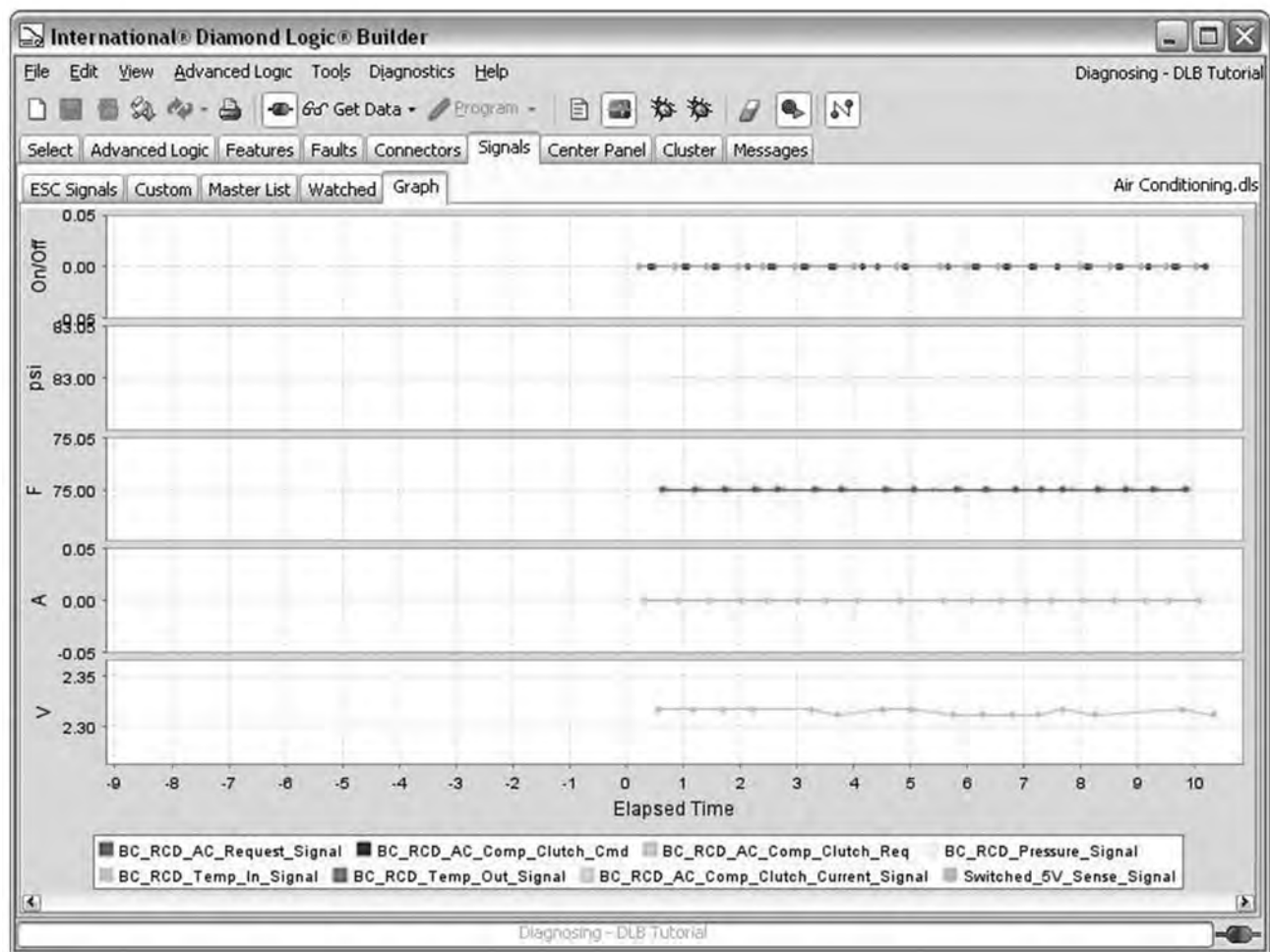
**Figure 81 Set Trigger Conditions – AC\_Request ON**

4. Specify when the selected signal will trigger recording of the signals to be graphed.
  - Rising Edge: Select this option if graphing should begin when the specified signal goes ON / TRUE.
  - Falling Edge: Select this option if graphing should begin when the trigger signal goes OFF / FALSE.
  - Value: If graphing should begin when the trigger signal reaches a specific value, enter the desired value. Note that this field may be a checkbox, a text entry field or a drop-down menu, depending on the type of signal selected.
  - Faults: If graphing should begin when a certain number of faults have occurred, enter the desired number of faults.
5. Specify the number of second that should be recorded after the trigger conditions indicated above are met.
6. Click OK to close the Edit Triggers window.



**Figure 82 Record Icon (Signal Trigger)**

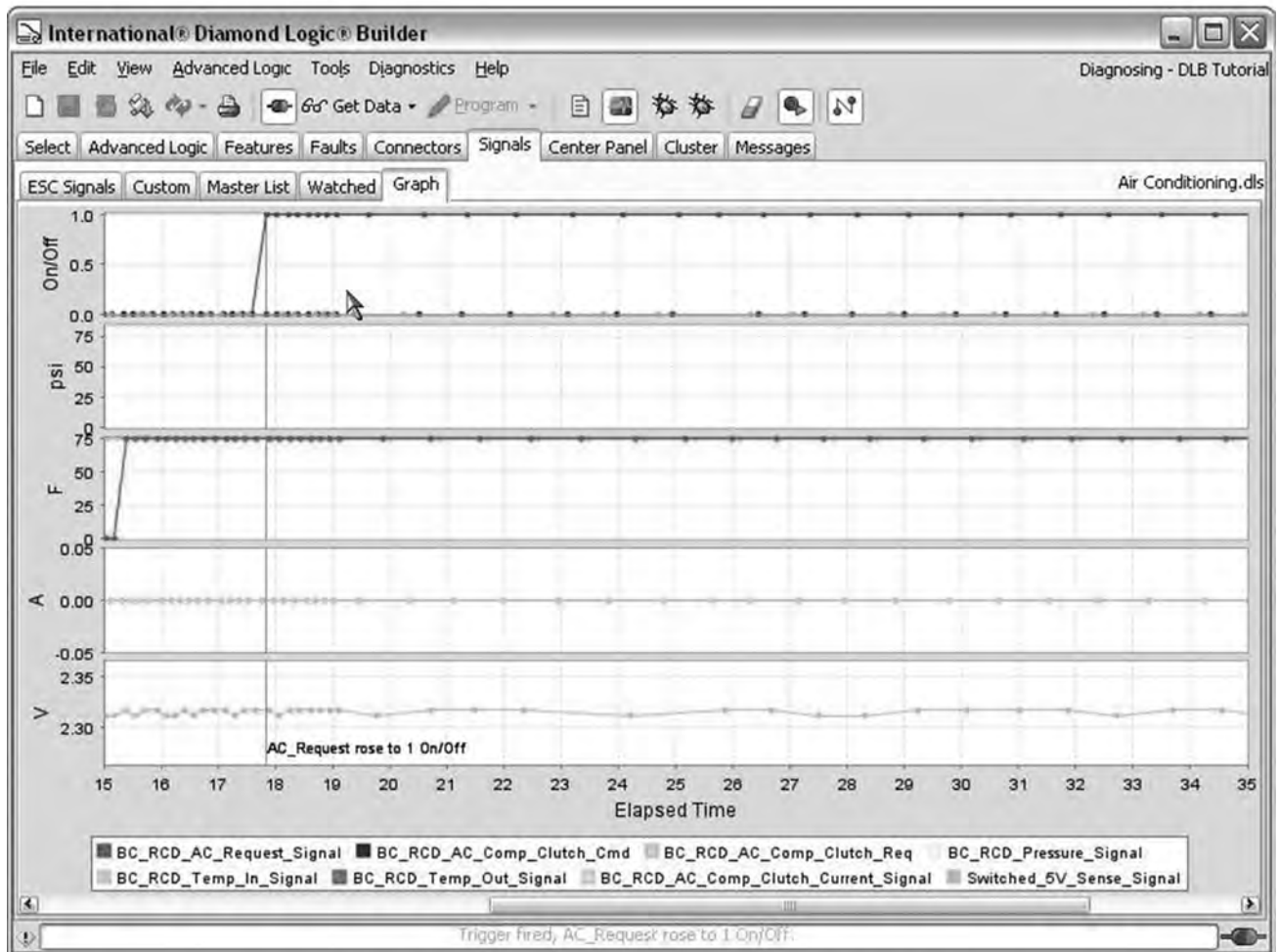
7. Click the Record icon to start the recording session.



0000410524

**Figure 83    Graph Sub-Tab, After Record is Clicked**

Once the session is running, your graph will start to move.



0000410525

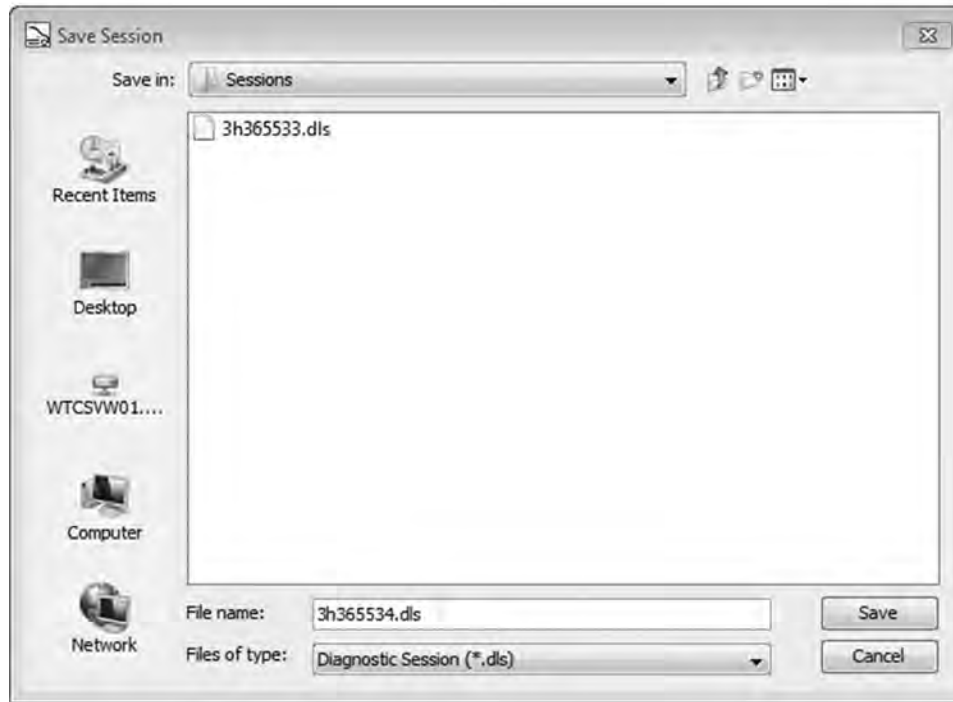
**Figure 84 Graph Sub-Tab, Recording Changes**

8. To see the graph change and the trigger set, force the trigger signal to the condition specified in Step 4. For example, if the trigger had been configured as shown in Set Trigger Conditions (Figure 81), you would set the AC\_Request signal to ON.

Once the trigger is set, the recording will automatically stop after the post-trigger time has expired.

### Saving Recorded Data

Although it is not recommended, custom sessions can be created and saved for later reference.



0000410522

**Figure 85 Saving a Session**

1. In the menu bar, select Diagnostics > Save Session As. The Save Session window appears.
2. Enter an appropriate filename for the saved session. (Session files will be saved with the .dls filename extension.)
3. Click Save.

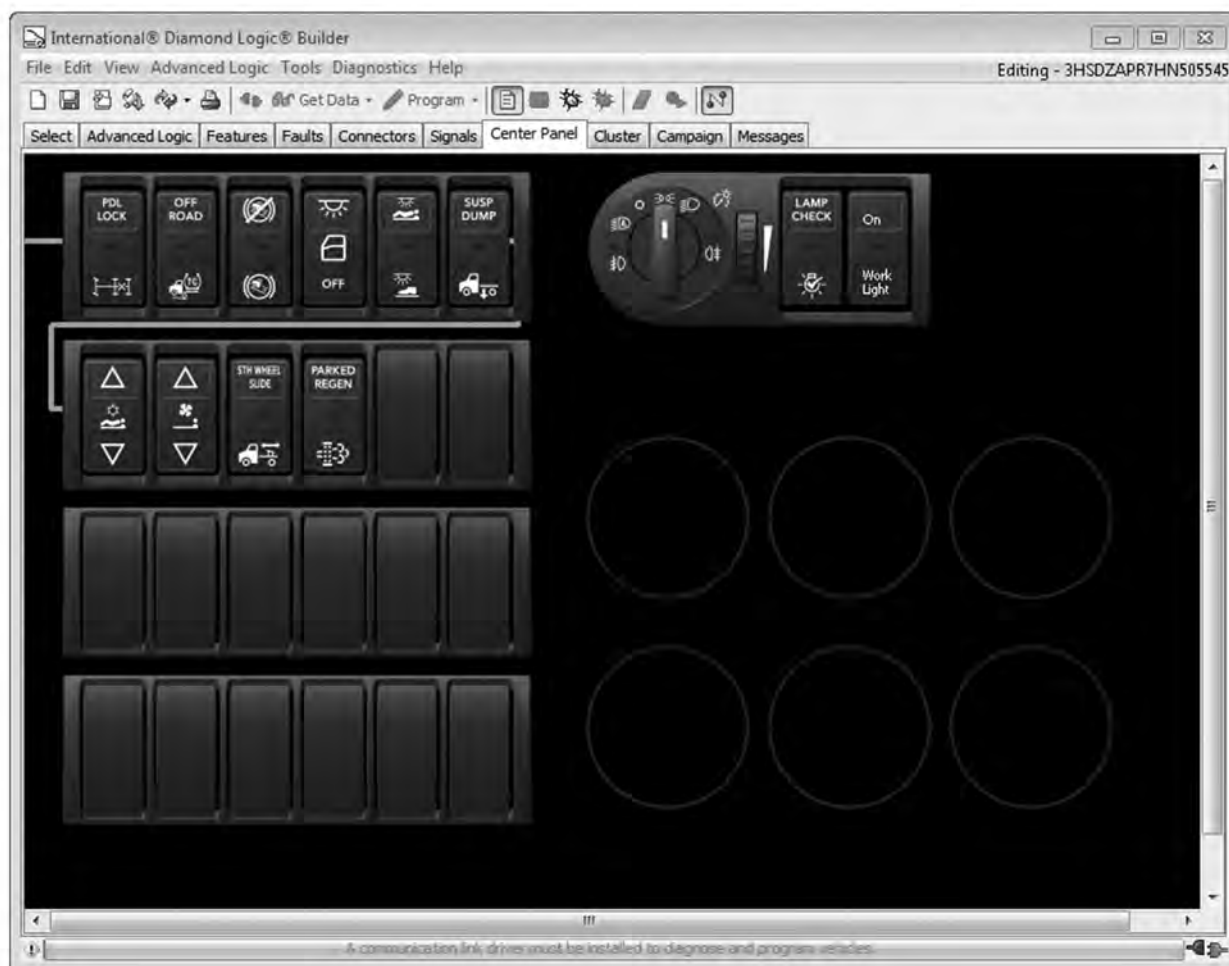
**NOTE – Be sure to note where your session is being saved to make it easy to find later.**

It is also possible to save the graphical data to a .csv file (a file of raw data values, separated by commas). Such files can be easily imported into spreadsheets and other programs that are used to manipulate and / or present data.

To save data to a .csv file, select Diagnostics > Save Graph Data in the menu bar.

## CENTER PANEL TAB

The Center Panel tab allows the user to view the vehicle Switch Panel arrangement. Horizontal and vertical scroll bars appear when needed for full view.



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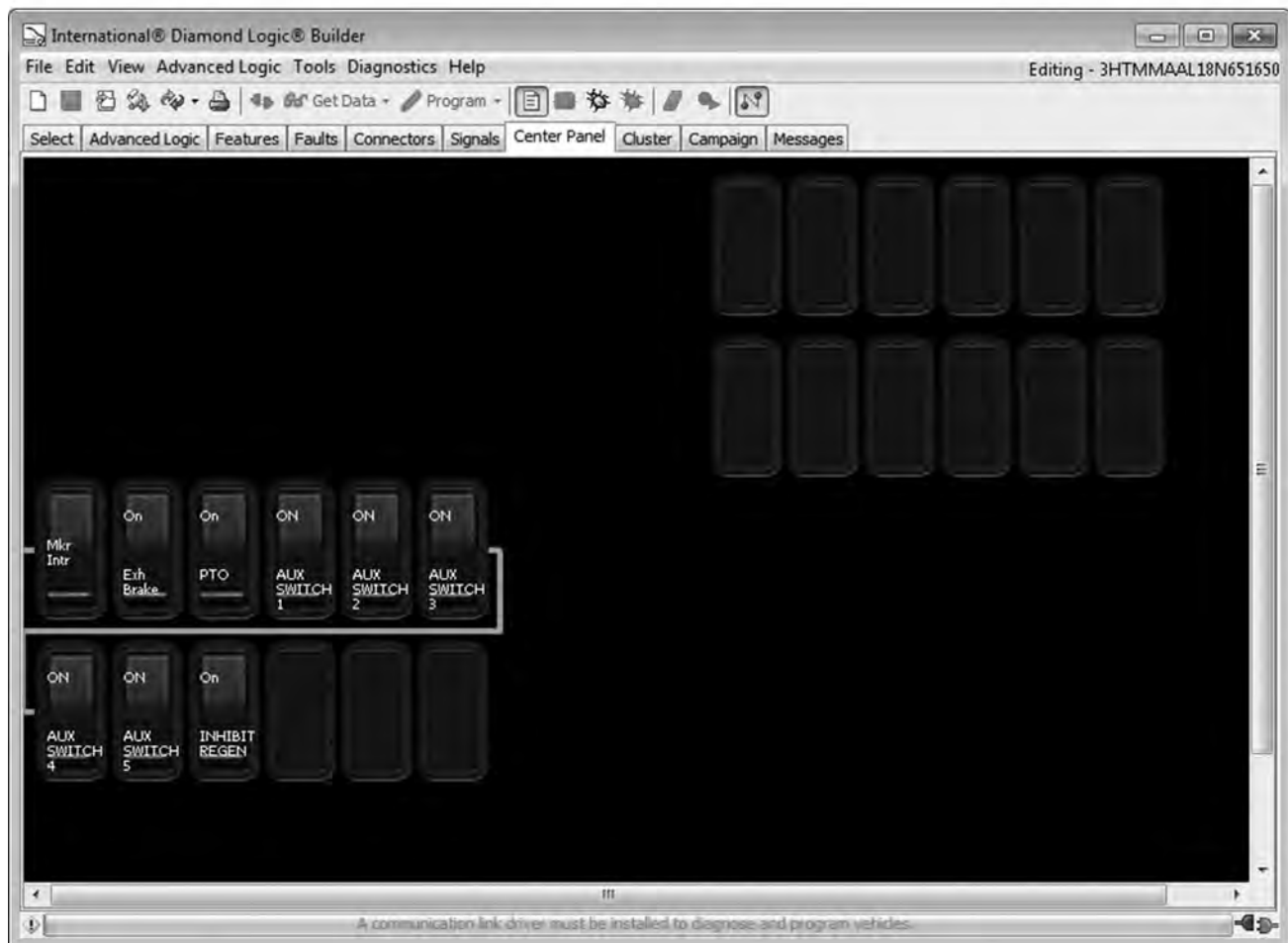
**Figure 86 Center Panel Tab, Example 1**

Center panel views will vary depending on the vehicle selected. In the figure above:

- The four rows of switches on the left each represent a slot in which a switch pack may be installed. The wire connection shown between the first two rows indicates that the second switch pack is present and populated.
- The Light Control Module (LCM) appears in the upper right. When the LCM appears on this tab (rather than the Cluster tab), the two rectangular switches may be dragged and dropped like any of the switches on the left.
- Up to six auxiliary gauges may appear in the lower right. In this case, there are no auxiliary gauges installed.

## TABS AND SUBTABS

The figure below shows a different vehicle that has four rows in which switch packs may be installed (two of which are used), but nothing else on this tab.



0000410518

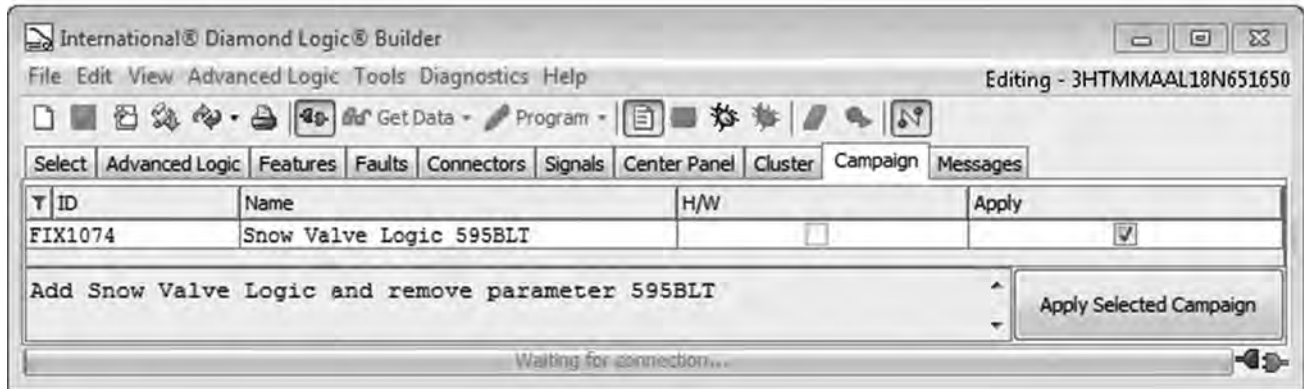
**Figure 87 Center Panel Tab, Example 2**

### Viewing Switch Feature Codes

Hovering the mouse over a switch will display the feature code associated with that feature.

## CAMPAIGN TAB

The Campaign tab is used to push programming changes that are set up as Campaigns. A Campaign ID will only be shown if there is a campaign that applies to this vehicle.



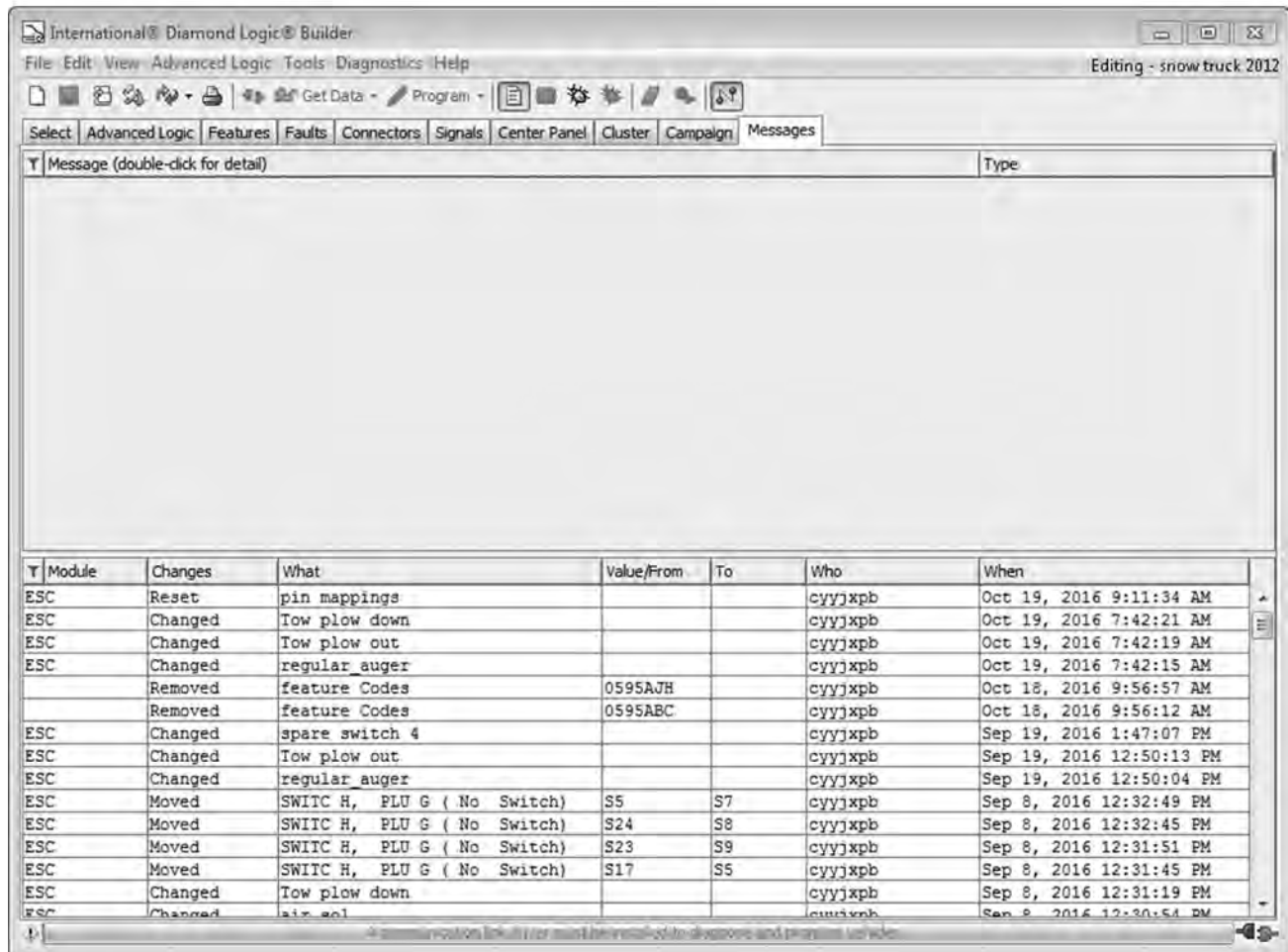
0000410516

**Figure 88 The Campaign Tab**

A message will display when one or more campaigns are available. To apply the campaign(s), you have to check the box under Apply column. If the check box is marked in the H/W column, make sure to have the hardware installed prior to selecting the APPLY SELECTED CAMPAIGN button. The changes will program when the programming process has completed.

## MESSAGES TAB

The Messages tab allows the user to view configuration errors, warnings and the programming history for the last programming change.



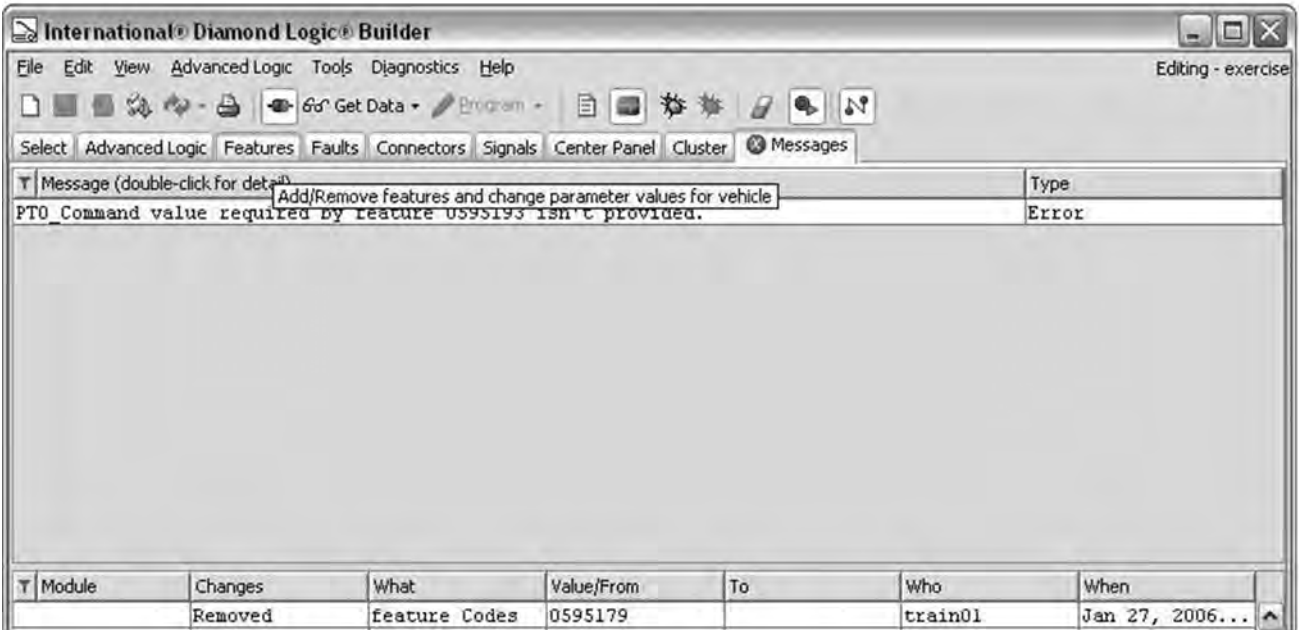
0000410550

Figure 89 The Messages Tab



Upper Panel

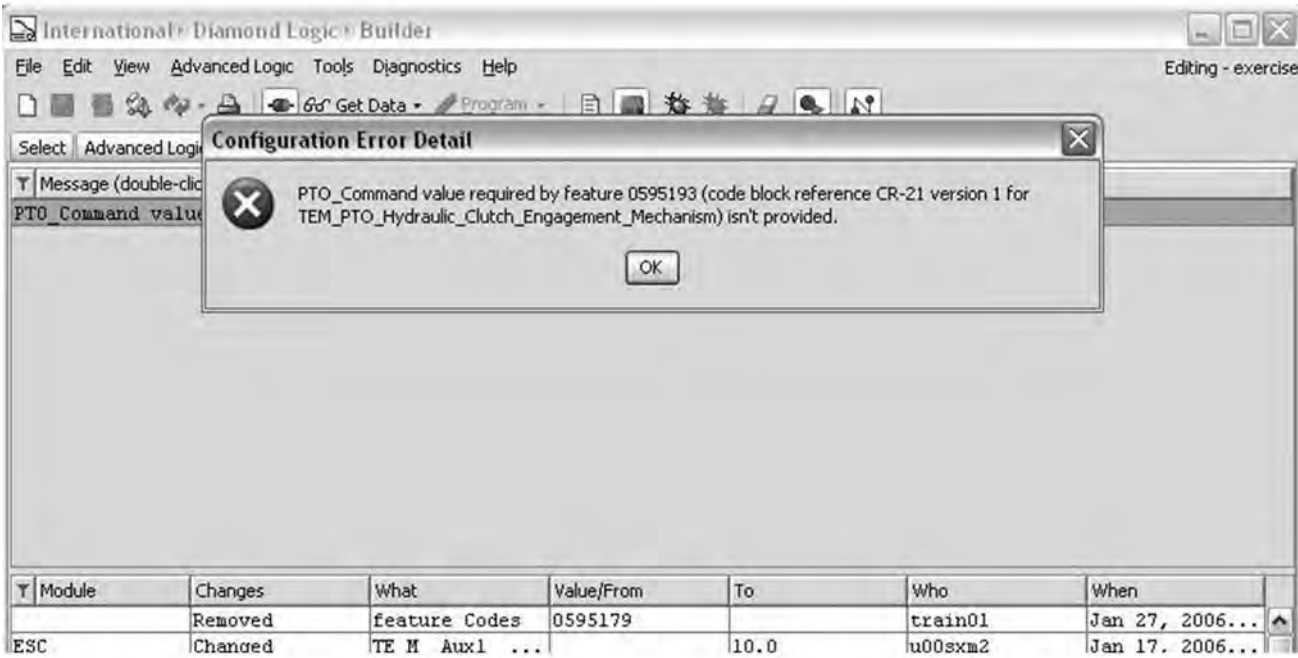
The upper panel displays a list of configuration errors (if any).



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Figure 90 Messages Tab, Upper Panel

Double-clicking on one of these messages will cause the message to be displayed in a popup window. The window contains the same text that appears in the Long Message column. However, it may be useful when that column is turned off or when the message is too long to be fully displayed in the Long Message column.



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Figure 91 Configuration Error Detail

## Types of Errors (What Do They Mean?)

Listed below are some examples of error messages and what causes them:

- **Feature xxxxxx and Feature xxxxxx conflict** – This error is generated when attempting to add two features that conflict with one another. For example, if the user tries to add 595259 (a feature for normally closed solenoids) and feature 595297 (a feature for normally open solenoids), this will generate the error shown below because the two different types of air solenoids cannot be used at the same time.



Figure 92 Feature xxxxxx and Feature xxxxxx Conflict Message

- **XXXX value required by feature XXXXXX is not provided** – This error is generated when parameters that are required by a feature are missing. For example, this error will be generated if the user tries to add 595179 (BC / BCM Programming for PTO) without adding a feature that would indicate what type of PTO will be used.

When you add a feature (for example, 595252 – Electric over Air, Non Clutched) that contains the parameters required by 595179, the error message will clear.

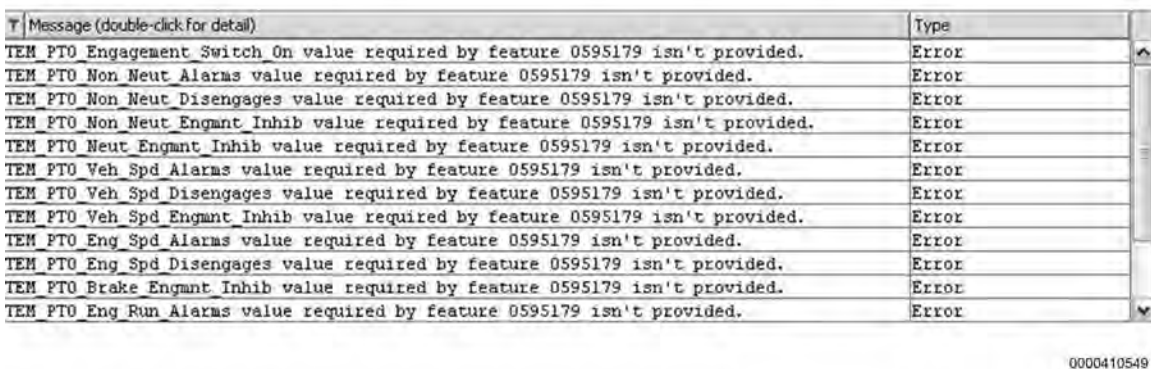
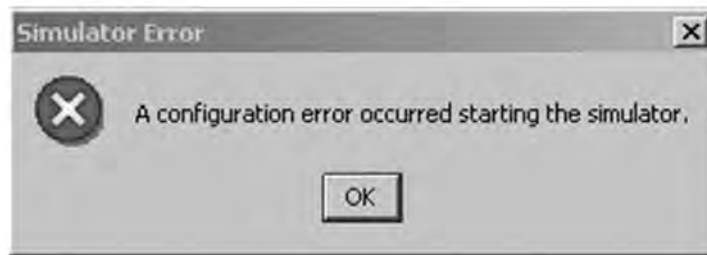


Figure 93 Value Required by Feature XXXXXX Isn't Provided Message

- **Simulation Error** – This error will be generated if the user attempts to simulate a program within DLB that exceeds the ESC / BC processing time limit.

This error is displayed as a pop-up on the screen that the user is currently viewing.

In order to eliminate this error, have the dealer or Body Builder reduce the number of rungs used within Advanced Logic or reduce the number of features applied to the truck.



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**Figure 94 Simulation Error Message**

**Columns in the Upper Half of the Messages Tab**

The columns in the upper half of the Messages tab include the following:

Name	Description
Message	Displays a particular error. Double-clicking will produce a pop-up window that displays the long description.
Type	Describes the conflict.
Long Message	Describes the conflict in detail.
Trace	Trace is meant for debugging software errors and is of no use to most Diamond Logic® Builder users. This column should be left off.

**Columns in the Lower Half of the Messages Tab**

The lower half of the Messages tab lists changes that have been made to a vehicle configuration since the last time it was programmed into a vehicle. This list will be cleared once the new configuration has been programmed into the vehicle and a new “READ” operation has been performed on the vehicle electrical system controller.

## DETERMINING THE VEHICLE'S CURRENT CONFIGURATION

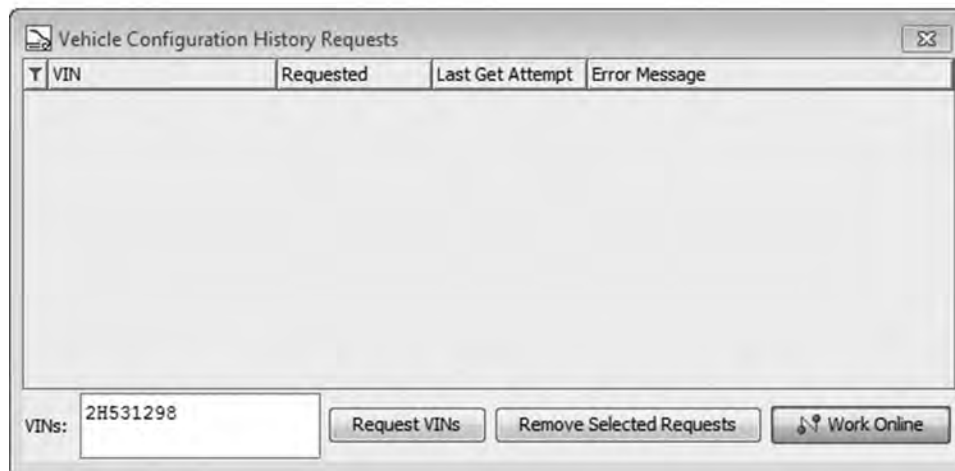
### GETTING VEHICLE CONFIGURATION HISTORY

The computer must be online connected to the Internet to get vehicle information from history.



**Figure 95 Get Vehicle Configuration Icon**

1. Open the Vehicle Configuration History Requests window by doing one of the following:
  - In the toolbar, click the Get Vehicle Configuration Icon.
  - In the menu bar, select File > Get From History



0000410553

**Figure 96 Vehicle Configuration History Requests**

2. In the VINs box, type the vehicle's VIN or the 8-digit chassis number.
3. Click the Request VINs button. The VIN requested appears in the list. Depending upon the usage of the Vehicle History Service by other users, the system will load your requested vehicle configuration file onto the computer. This will take from a few seconds to a few minutes.



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**Figure 97 Confirm Overwrite Window**

## DETERMINING THE VEHICLE'S CURRENT CONFIGURATION

4. If the user already has previous copy of the VIN file on the computer, a Confirm Overwrite window appears. Select YES to override the current vehicle configuration version on the computer and highlight the vehicle in the listing.

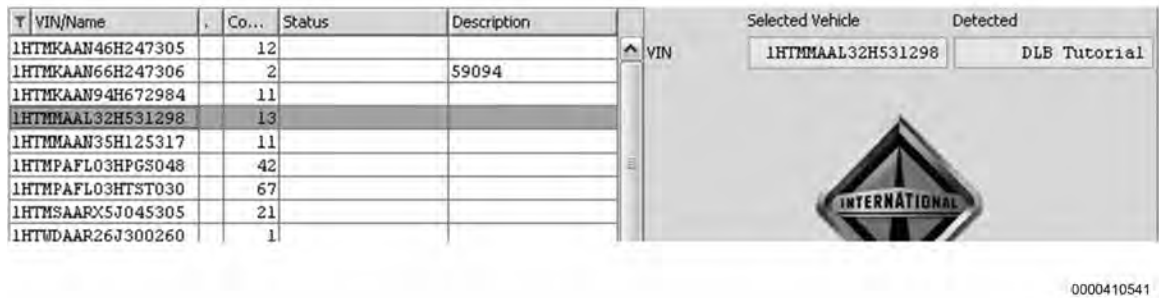
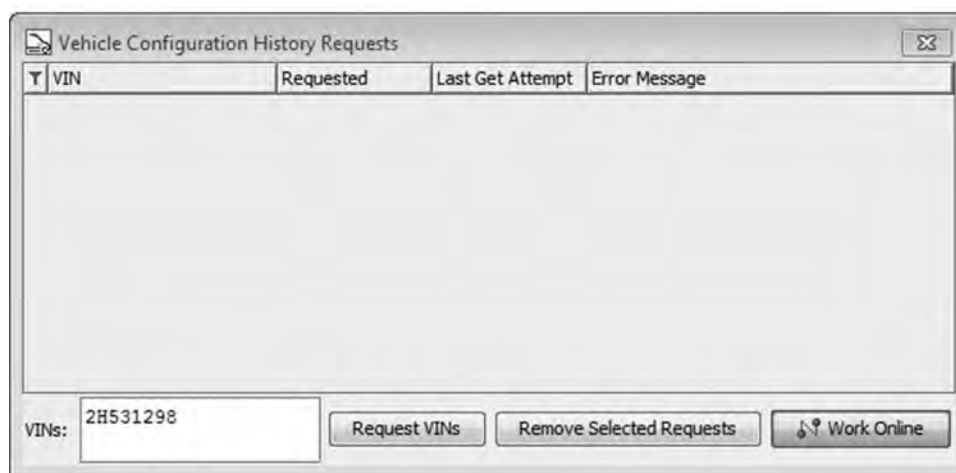


Figure 98 Vehicle Highlighted in List

### ADDITIONAL BUTTONS IN VEHICLE CONFIGURATION HISTORY REQUESTS

The Vehicle Configuration History Requests window has two additional buttons: Remove Selected Requests and Work Online.



0000410553

**Figure 99 Vehicle Configuration History Requests Window**

#### Remove Selected Requests

Clicking the Remove Selected Requests button will remove the selected VIN request from the list.

#### Work Online

Selecting the Work Online button, will allow the user to work online or offline. Working “online” means that the user is connected to the Diamond Logic® Builder program resources at Navistar through the Internet.



**Figure 100 Offline Icon (No Signal)**

When DLB is being used offline, the icons in the following locations will indicate that there is no signal:

- Work Online / Work Offline button in Vehicle Configuration History Requests window
- Toolbar Go Online / Go Offline button
- File Menu Work Online / Work Offline option.



### OTHER WAYS TO OBTAIN VEHICLE INFORMATION

#### Connecting to the Vehicle

The user can also get the vehicle information by simply connecting up to the vehicle. This is the most accurate way.

- If the user does not have a version of the vehicle's information already, connecting to the vehicle will automatically read the information contained in the ESC / BC.
- If the user has a version but the vehicle is at a later revision, click the Get Data icon in the toolbar to read the latest configuration from the vehicle.



**Figure 101 Get Data Icon**

### CREATING AND APPLYING A TEMPLATE

A template is a separate file that captures and stores vehicle configuration changes that have been performed using the Diamond Logic<sup>®</sup> Builder software. These changes can be any of the following:

- Adding / Deleting 595XXX or 597XXX Features
- Changing Programmable Parameters
- Moving Pin, Switch or Gauge Locations
- Adding or Modifying Advanced Logic Blocks

A template is a programming guide that summarizes the features and parameter settings that are to be applied to a vehicle configuration. The template can be loaded to a vehicle and can be saved for future use on additional vehicles. Once a template is saved it can be exported or emailed just like any other data file. Multiple templates can be applied to a vehicle or a series of vehicles.

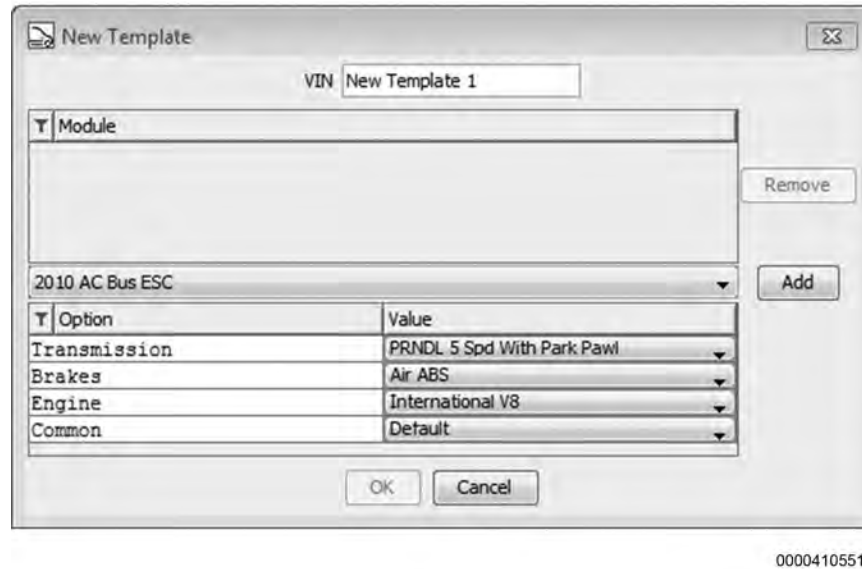
**IMPORTANT – When multiple templates are required. Create one master template with all required templates to help minimize programming errors.**

There are two options available for creating a template:

- Creating a New Template from Scratch
- Modifying a Copy of an Existing Template

## CREATING A NEW TEMPLATE FROM SCRATCH

1. In the Menu Bar, select File > New. The New Template window appears.



**Figure 102 New Template Window**

2. In the VIN box, enter a name for this template.
3. For each module to be added to the template:
  - a. In the drop-down to the left of the Add button, select the module to be added. The options for the selected module will now be listed in the table below the drop-down.
  - b. Select the desired value for each listed option.
  - c. Click Add to add the selected module to the list in the upper portion of the window.
4. Once all desired modules have been added to the list, click OK to create the template.

**NOTE – There is currently no GEN 4 BCM.**

The new template should now be listed on the Select tab.

## CREATING AND APPLYING A TEMPLATE

### CREATING A NEW TEMPLATE FROM AN EXISTING TEMPLATE OR VIN

It is possible to create a template based on an existing template or VIN. This simplifies the creation of a template if the new template will differ in only a few options or attributes from the already existing template.

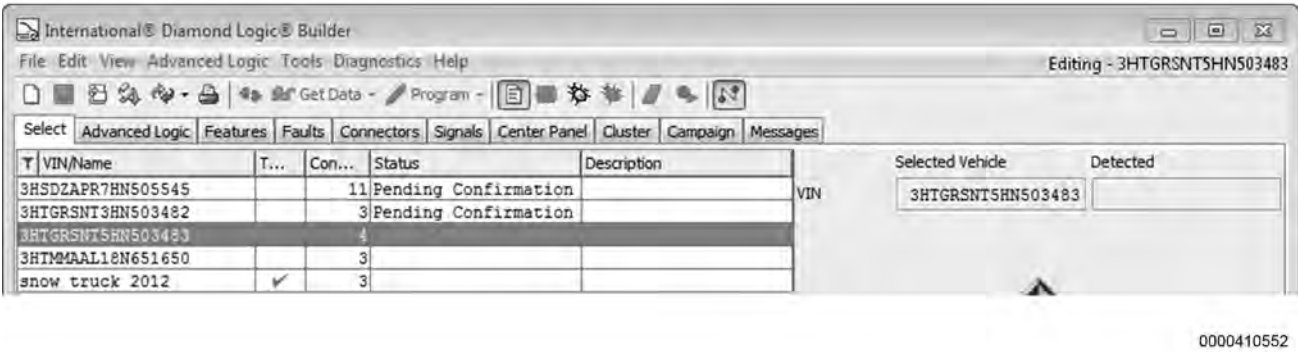


Figure 103 Select Tab

1. On the Select tab, click the existing template to copy.
2. In the menu bar, select File > Make Template. The Make Template window appears.

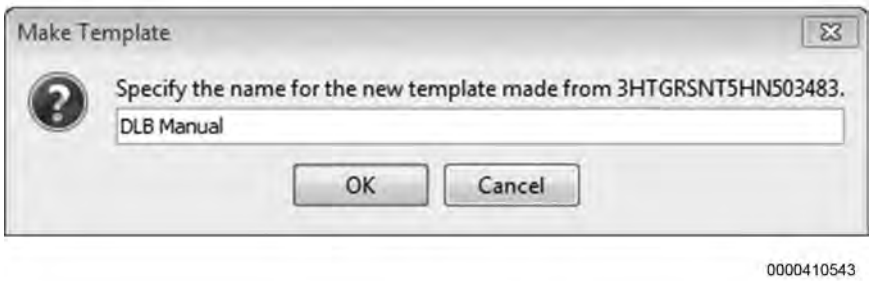
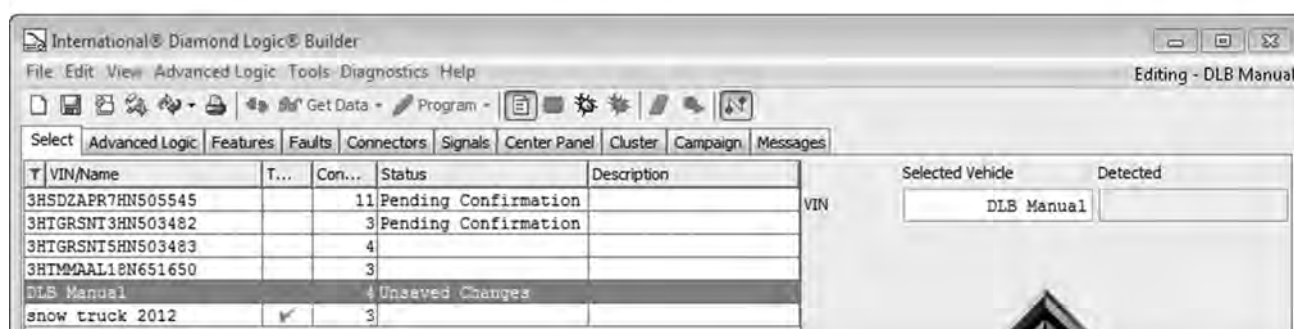


Figure 104 Make Template Window

3. Enter a template name between 1 – 16 characters in length.
4. Click OK.

The new template will now be listed on the Select tab.



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Figure 105 New Template Listed on Select Tab

On the Select tab, templates will have a GREEN check in the Template column.

## TEMPLATE MAINTENANCE

**IMPORTANT** – It is extremely important to save and back up copies of all templates created or changed. Navistar does not store or retrieve templates. Until the templates are applied to a vehicle and the vehicle is programmed, they are just templates on your computer. Navistar only tracks vehicle information that has been programmed into a vehicle.

**IMPORTANT** – It is highly recommended that the vehicle configuration be printed whenever modifications are made to a VIN. These modifications include (but are not limited to): adding, deleting, moving, or modifying switches, features, advanced logic, or outputs / inputs on the connectors.

The printed vehicle configuration should be stored with the vehicle for future reference in diagnostics, repair, and modification or reprogramming.

## CREATING AND APPLYING A TEMPLATE

### APPLYING A TEMPLATE

Follow these steps to apply a template and program a vehicle:

1. On the Select tab, select the vehicle to be programmed.

T	VIN/Name	Template	Configuration Version	Status	Description
	3HSDZAPR7HN505545		11	Pending Confirmation	
	3HTGRSNI3HN503482		3	Pending Confirmation	
	3HTGRSNI3HN503483		4		
	3HTMMAAL18N651650		3		

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**Figure 106 Selecting the Vehicle**

2. In the toolbar, click the Apply Configuration icon.



**Figure 107 Apply Configuration Icon**

The Apply Templates window appears.

T	VIN/Name	Last Changed By	Last Changed Date	Description
	2017 Heavy Duty	u01m189	Nov 17, 2016 11:49:07 AM	
	snow truck 2012	cyyjxpb	Oct 19, 2016 10:50:56 AM	

Apply

☒ All ☐ Advanced Logic ☒ Features ☒ Parameters ☒ Switches & Gauge Locations

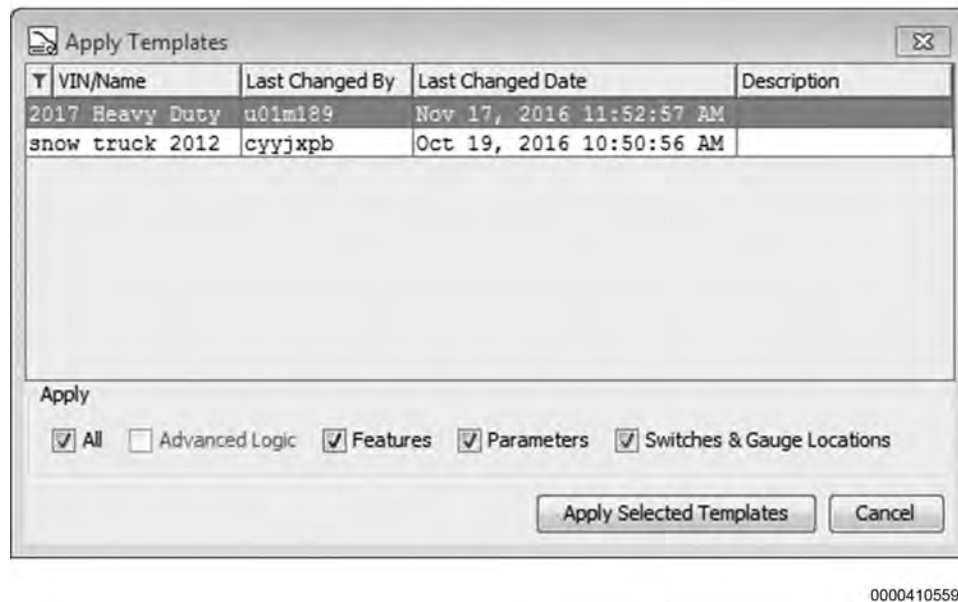
Apply Selected Templates Cancel

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**Figure 108 Apply Templates Window**

3. Select the template to be applied.
4. Check the boxes of your choice in the Apply section.

5. Click the Apply Selected Templates button. It is possible to select and apply several templates to a vehicle.



**Figure 109 Apply Templates Window, with Template Selected**

After applying the template, the selected vehicle displays Unsaved Changes in the Status column.

**NOTE – It is highly recommended to use the Connectors, Signals, and Features tabs to verify the accuracy of the pins, switches, and programmable parameter changes the user has made.**

6. Save changes to the selected vehicle by doing one of the following:
- In the Menu Bar, select File > Save.
  - Click the Save icon in the toolbar.



**Figure 110 Save Icon**

7. Program the changes into the vehicle (page 119).

ADDING A FEATURE

1. On the Select tab, select the template or VIN or template to which this feature is to be added.

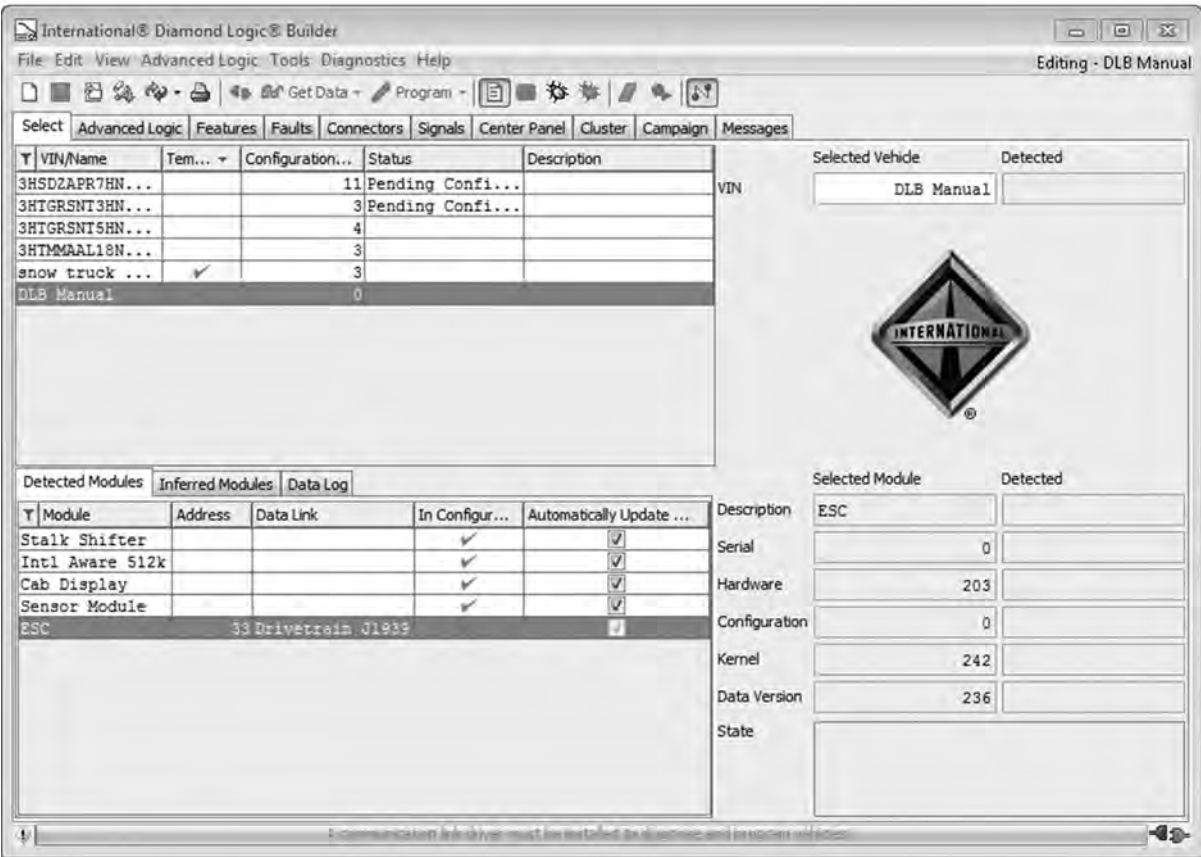


Figure 111 Selecting a Template

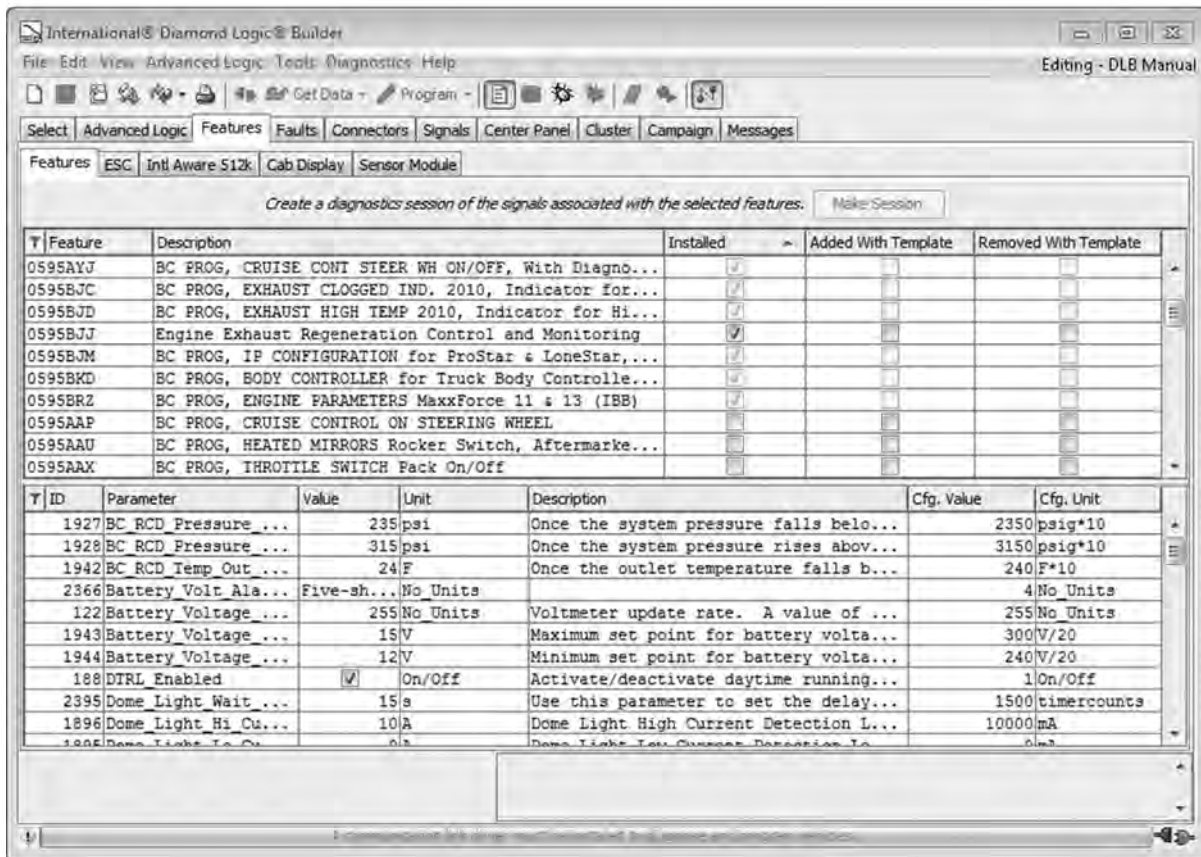
2. Click the Features tab. The upper portion of the tab lists all features that have been developed for the ESC / BC.

With a **VIN** selected, the listing is organized in three different columns:

- The Feature column identifies the software identification number for each packet of software code. These packets are referred to as 595 or 597 codes because the identification number always starts with either 595 (595XXX) or 597 (597XXX).
- The Description column provides a short text description of the feature.
- The Installed column indicates the installed status of a feature for the vehicle configuration. A checked box indicates the feature IS installed in the vehicle's configuration. An unchecked box indicates that the feature IS NOT installed in the vehicle's configuration.

**NOTE – A grayed out box, with a check mark, means that the feature is active but cannot be changed with the current user's permissions.**





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Figure 112 Feature List

When a template is selected, you must enable the Added With Template and Removed with Template columns. To do this, right-click on any of the column headings, and then check the names of these additional columns in the right-click menu.

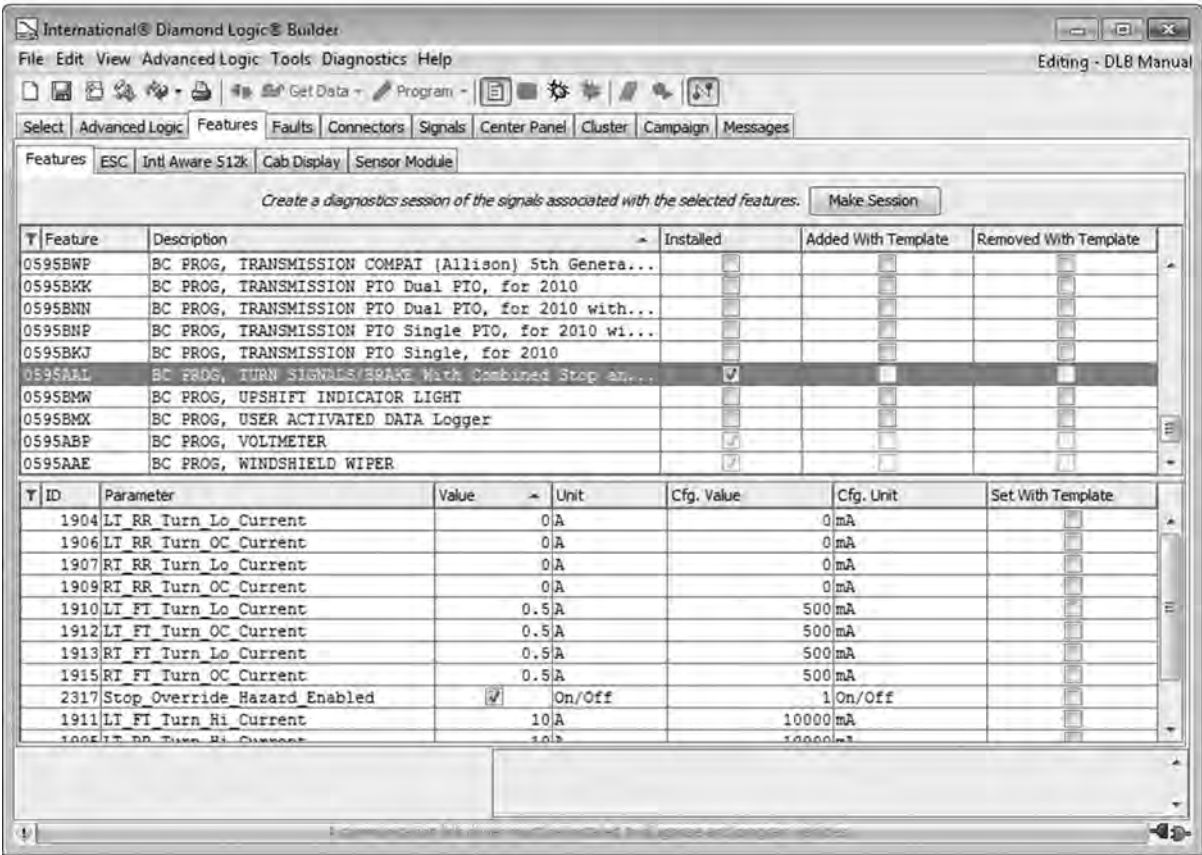
With these two active, the listing should have five different columns:

- The Feature column identifies the software identification number for each packet of software code.
- The Description column provides a short text description of the feature.
- The Installed column indicates the installed status of a feature for the vehicle's configuration. A checked box indicates the feature IS installed in the vehicle's configuration. An Unchecked box indicates that the feature IS NOT installed in the vehicle's configuration.
- The Added with Template column provides the option to include features in VIN configurations when this template is applied. A checked box means the associated feature will automatically be included in all VIN configurations that have this template applied to them. An unchecked box has no effect on the template.
- The Removed with Template column provides the option to remove features from VIN configurations when this template is applied. A checked box means the associated feature will automatically be removed from a VIN configuration when this template is applied to them.

# ADDING A FEATURE

The listing of features may be sorted in multiple ways. Clicking on any of the column headings will cause the entire table to be sorted in an ascending or descending order as defined by the column data.

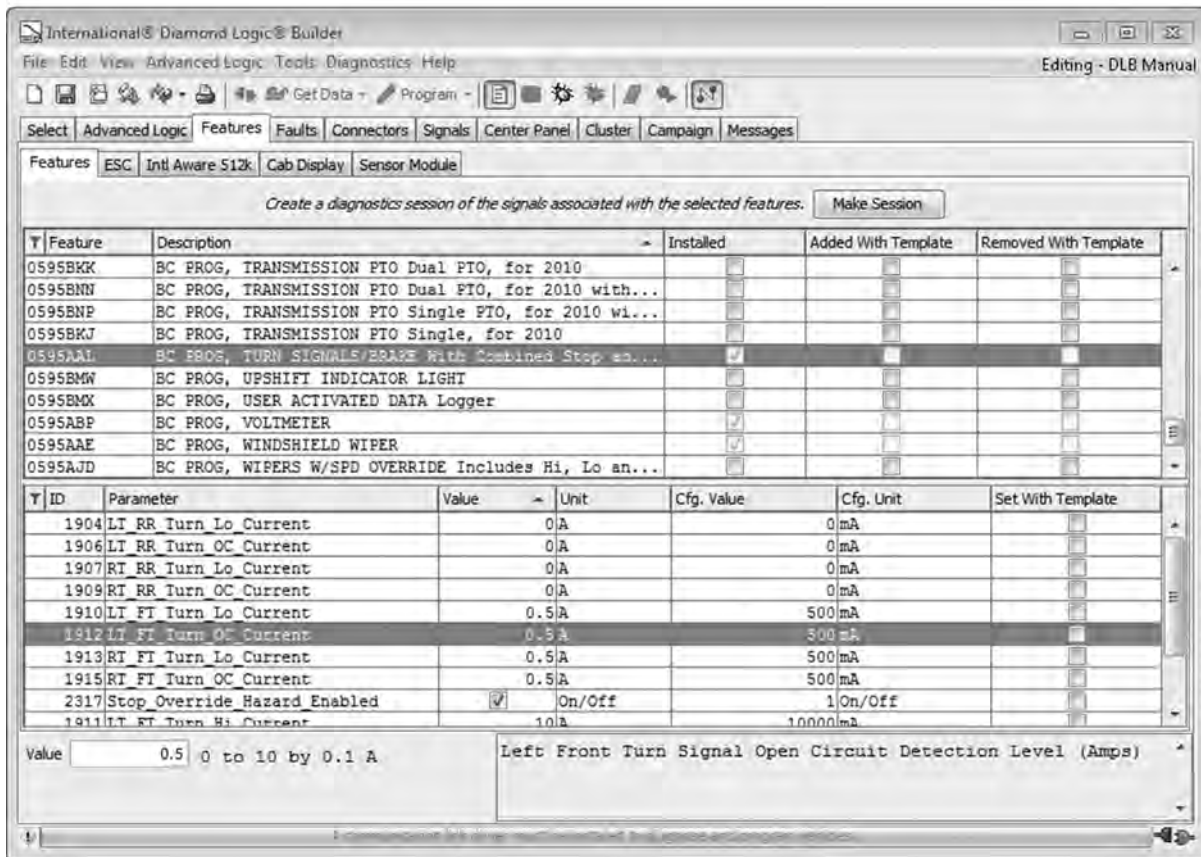
- 3. Scroll through the available features until the one to be added is found. Check the Installed box to add the feature.



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Figure 113 Feature List, with Feature Selected

The lower half of the tab now displays a list of programmable parameters that are associated with this feature. Not all features will have programmable parameters.



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Figure 114 Editing Parameter Values

4. Edit the parameter values in the lower half of the window as needed / desired. To edit an individual value:
  - a. Select the parameter to edit. An editable field for the selected parameter will now appear in the lower-left corner of the window. A description of the parameter will be displayed in the lower-right corner.
  - b. Edit the Value displayed in the lower-left corner. There are three types of values:
    - If the parameter permits an ON or OFF value only, there will be a check box. A checked box indicates the programmable parameter is on. An unchecked box indicates the programmable parameter is off.
    - For parameters that require numerical values, a box is provided to type in the new data value. An allowable range of values will typically be displayed to the right of the box.
    - Other parameters provide the ability to make a choice from a list. Only one choice from the list may be selected for the feature file.

**NOTE** – A value can also be edited by clicking in the Value column of the programmable parameters listing itself.

## ADDING A FEATURE

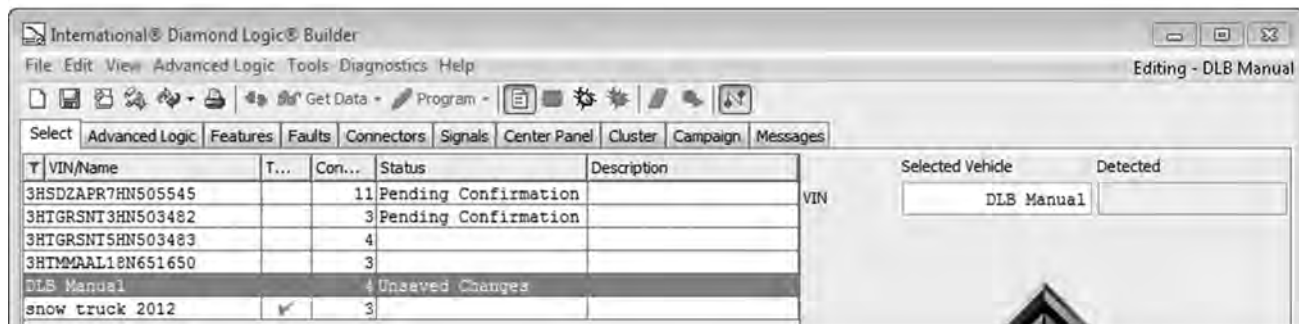
T	ID	Parameter	Value	Unit	Cfg. Value	Cfg. Unit	Set With Template
	1910	LT_FT_Turn_Lo_Current	0.5	A	500	mA	<input type="checkbox"/>
	1912	LT_FT_Turn_OC_Current	0.5	A	500	mA	<input checked="" type="checkbox"/>
	2225	Park_Light_Lo_Current	0.5	A	500	mA	<input type="checkbox"/>
	2221	Park_Light_OC_Current	0.5	A	500	mA	<input type="checkbox"/>
	1913	RT_FT_Turn_Lo_Current	0.5	A	500	mA	<input type="checkbox"/>
	1915	RT_FT_Turn_OC_Current	0.5	A	500	mA	<input type="checkbox"/>
	1911	LT_FT_Turn_Hi_Current	10	A	10000	mA	<input type="checkbox"/>
	1914	RT_FT_Turn_Hi_Current	10	A	10000	mA	<input type="checkbox"/>

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**Figure 115 Set With Template Checkbox**

- When editing the programmable parameters in a template, ensure that the associated box in the Set With Template column is checked for each value that has been modified. If this box is NOT checked, the updated value will not be applied when the template is applied to a VIN.

**NOTE – As long as changes are not saved, it is possible to change back to original feature and programmable parameter choices by selecting File > Revert in the menu bar. Once the file has been saved, removing feature or programmable parameter selections must be done manually.**



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**Figure 116 Select Tab Status Column – Unsaved Changes**

- Prior to saving, the Status column on the Select tab will indicate that there are Unsaved Changes to the modified VIN or template (Figure 116). These changes must be saved before they can be programmed into a vehicle. There are two ways to save changes:
  - In the menu bar, select File > Save.
  - In the toolbar, click the Save icon.



**Figure 117 Save Icon**

On the Select tab, the Status column for the modified VIN or template should now be clear for the modified VIN or template. (It will no longer indicate that there are Unsaved Changes.)

T	VIN/Name	Template	Configuration Vers...	Status	Description
	3HSDZAPR7HN...		11	Pending Con...	
	3HTGRSNT3HN...		3	Pending Con...	
	3HTGRSNT5HN...		4		
	3HTMMAL18N...		3		
	snow truck ...	✓	3		
	DLB Manual		1		

0000410566

Figure 118 Status Column on Select Tab Clear

7. Program the changes into the vehicle (page 119).

**NOTE – Always refer to the documentation on the Navistar Body Builder website when adding or removing features or to diagnose and fix any conflicts that may occur.**

**NOTE – It is highly recommended that the vehicle configuration be printed whenever modifications are made to a VIN. These modifications include (but are not limited to): adding, deleting, moving, or modifying switches, features, advanced logic, or outputs / inputs on the connectors.**

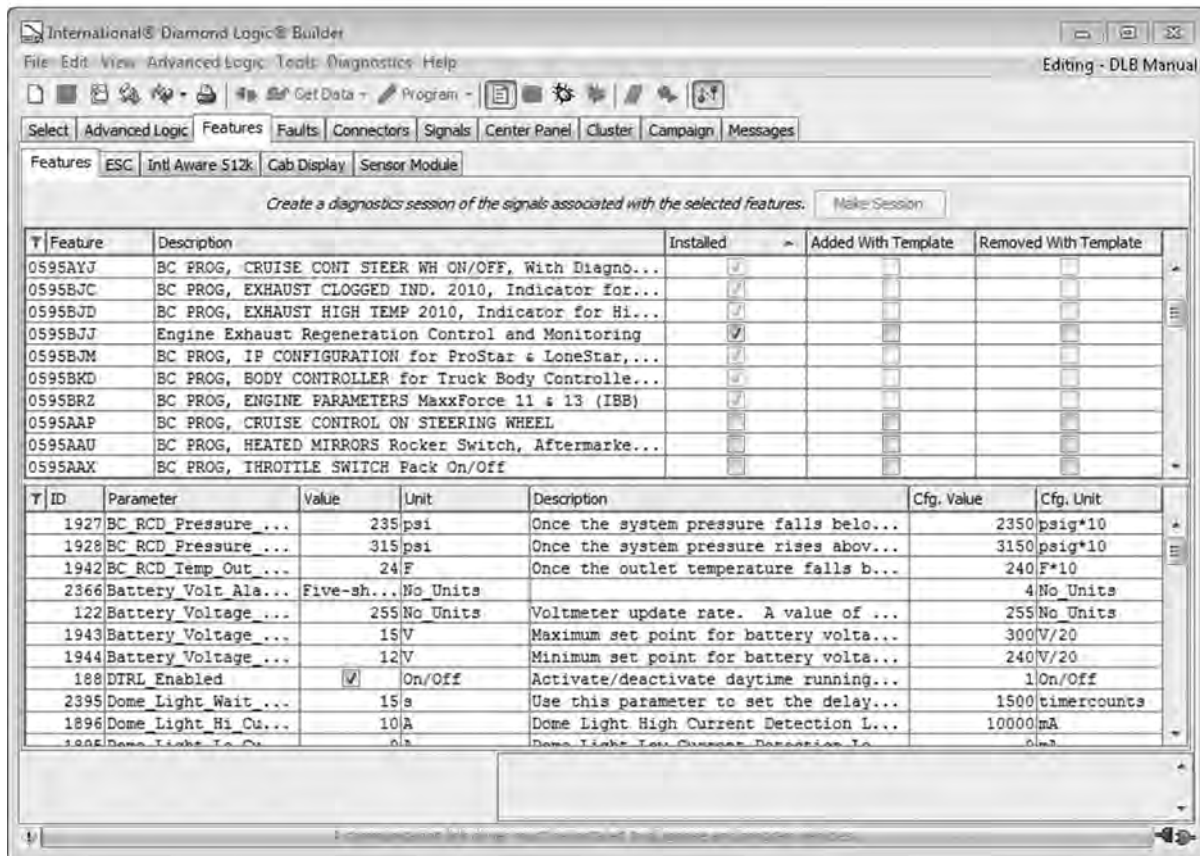
The printed vehicle configuration should be stored with the vehicle for future reference in diagnostics, repair, and modification or reprogramming.

## CHANGING PROGRAMMABLE PARAMETERS

It is possible to edit programmable parameters in either a VIN or a template. Be aware, however, that editing programmable parameters in a VIN will cause the changed values that have been saved to automatically be programmed the next time the vehicle is programmed.

It is better to create a template from the original VIN and make the parameter modifications to the template. The template can be applied to the VIN and then programmed in the vehicle.

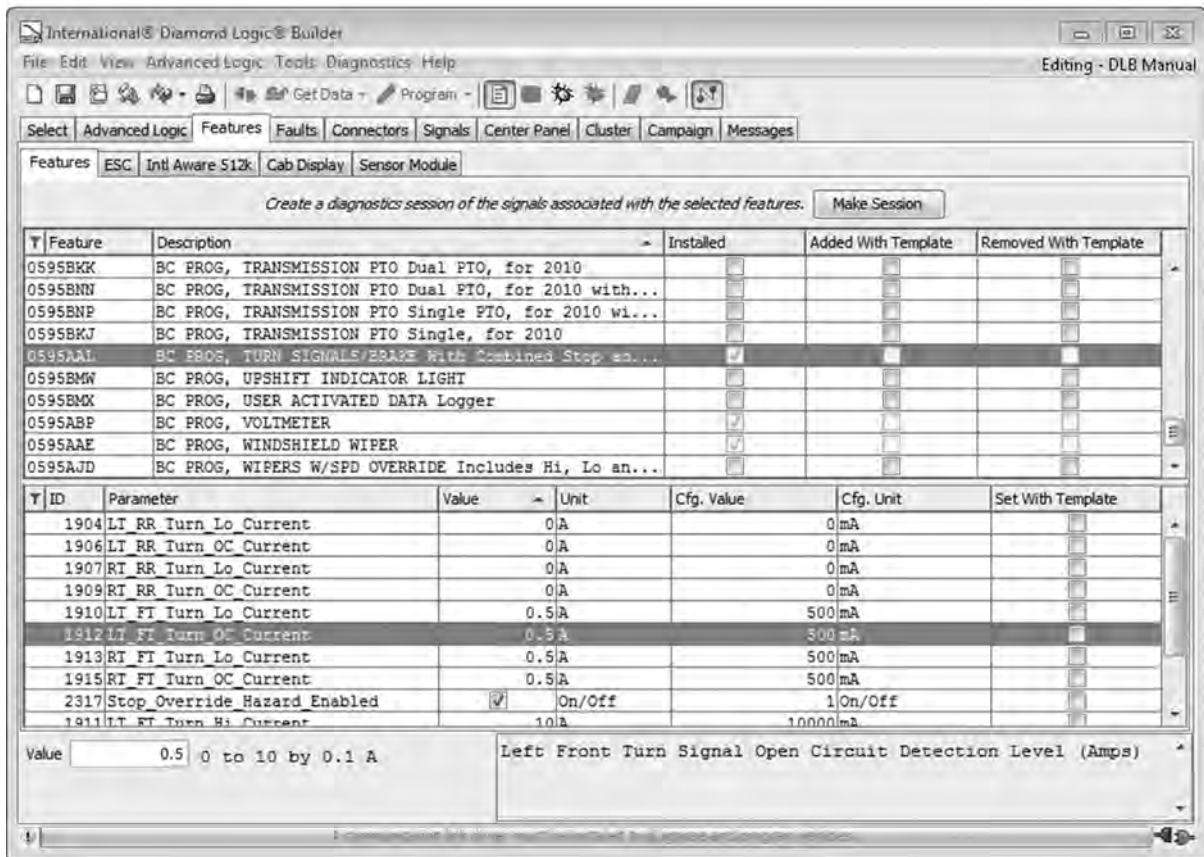
1. On the Select tab, select the template or VIN whose parameters you wish to modify.
2. Select the Features tab. The upper portion of this tab lists all available features. The lower half of the tab lists all the parameters available to change on the selected vehicle or template, including their current value, units, and the ID.



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**Figure 119 The Features Tab**

3. Scroll through the available features and find the feature whose programmable parameters need to be changed. Select the feature by clicking on its feature number or its description. The lower half of the tab now displays a list of programmable parameters that are associated with this feature. Not all features will have programmable parameters.



0000410560

Figure 120 Features Tab, with Feature Selected

4. Edit the parameter values in the lower half of the window as needed / desired. To edit an individual value:
  - a. Select the parameter to edit. An editable field for the selected parameter will now appear in the lower-left corner of the window. A description of the parameter will be displayed in the lower-right corner.
  - b. Edit the Value displayed in the lower-left corner. There are three types of values:
    - If the parameter permits an ON or OFF value only, there will be a check box. A checked box indicates the programmable parameter is on. An unchecked box indicates the programmable parameter is off.
    - For parameters that require numerical values, a box is provided to type in the new data value. An allowable range of values will typically be displayed to the right of the box.
    - Other parameters provide the ability to make a choice from a list. Only one choice from the list may be selected for the feature file.

## CHANGING PROGRAMMABLE PARAMETERS

A value can also be edited by clicking in the Value Column of the programmable parameters listing itself.

T ID	Parameter	Value	Unit	Cfg. Value	Cfg. Unit	Set With Template
1910	LT FI Turn Lo Current	0.5	A	500	mA	<input type="checkbox"/>
1912	LT FI Turn OC Current	0.5	A	500	mA	<input checked="" type="checkbox"/>
2225	Park Light Lo Current	0.5	A	500	mA	<input type="checkbox"/>
2221	Park Light OC Current	0.5	A	500	mA	<input type="checkbox"/>

0000410561

**Figure 121 Editing the Value Column**

- When editing the programmable parameters in a template, ensure that the associated box in the Set With Template column is checked for each value that has been modified. If this box is NOT checked, the updated value will not be applied when the template is applied to a VIN.

**NOTE – As long as changes are not saved, it is possible to change back to original feature and programmable parameter choices by selecting File > Revert in the menu bar. Once the file has been saved, removing feature or programmable parameter selections must be done manually.**

- Prior to saving, the Status column on the Select tab will indicate that there are Unsaved Changes to the modified VIN or template. These changes must be saved before they can be programmed into a vehicle. There are two ways to save changes:
  - In the menu bar, select File > Save.
  - In the toolbar, click the Save icon.



**Figure 122 Save Icon**

- Program the changes into the vehicle (page 119).

**NOTE – It is highly recommended that the vehicle configuration be printed whenever modifications are made to a VIN. These modifications include (but are not limited to): adding, deleting, moving, or modifying switches, features, advanced logic, or outputs / inputs on the connectors.**

The printed vehicle configuration should be stored with the vehicle for future reference in diagnostics, repair, and modification or reprogramming.



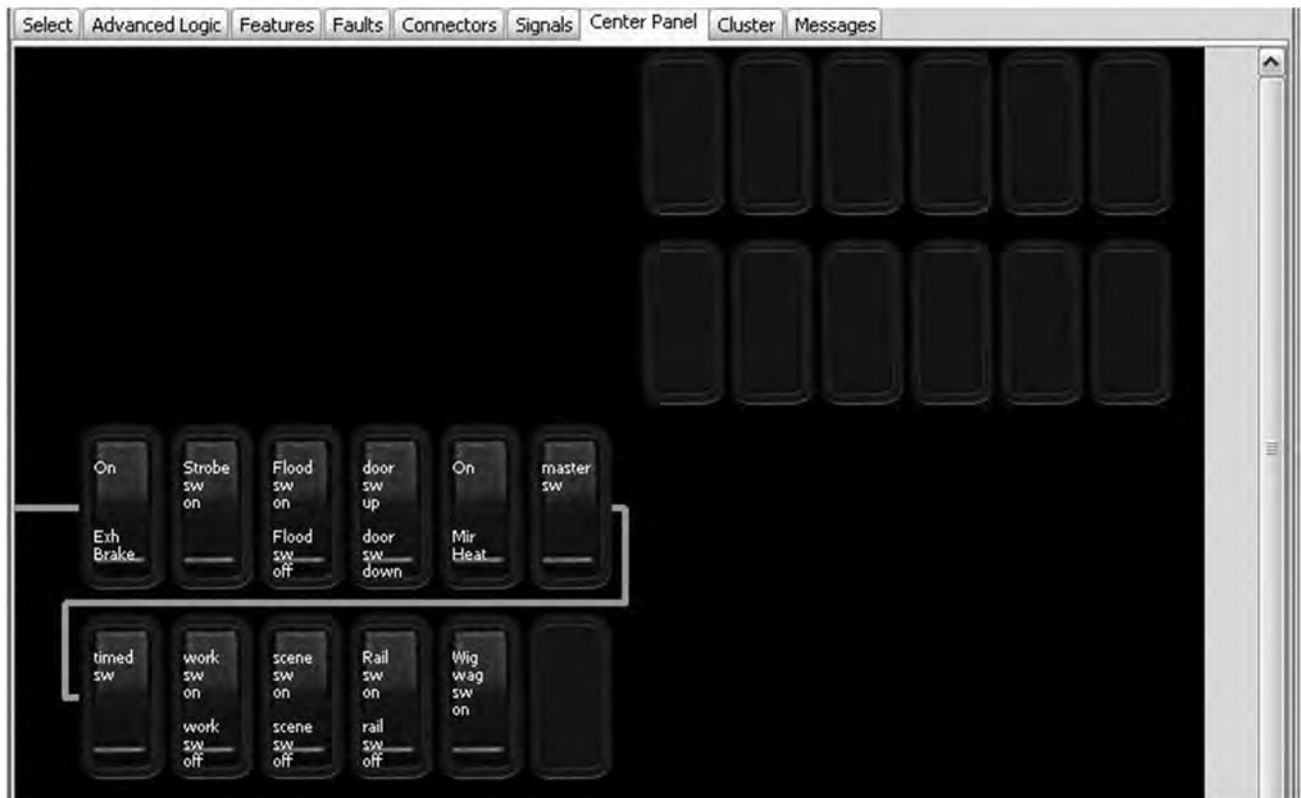
## CHANGING SWITCH, GAUGE AND PIN-OUT CONFIGURATIONS

### MOVING CENTER PANEL SWITCHES

Switches on the center panel are generated when programmable features are added to the vehicle on the Features tab or an advanced logic template when switch features or custom switches are applied.

A switch can be moved by clicking and dragging it to the desired location.

**NOTE – Changing the switch location is a function in DLB. DLB changes the switch configuration in the BCM, and the BCM alone controls this functionality. You are not programming any part of the actual switch pack when this action is performed. The base programming software level within the switch pack(s) is known as a kernel, is covered later in this manual.**



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Figure 123 Center Panel Tab

## CHANGING SWITCH, GAUGE AND PIN-OUT CONFIGURATIONS

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In the image below, the MASTER SW was moved to the lower bank by clicking and dragging.



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**Figure 124 Master Switch Moved to Lower Bank**

Hovering over a switch invokes a pop-up that describes the switch. When hovering over a blank, this pop-up reads Plug (No Switch).

## MOVING SWITCHES ON THE CLUSTER (ON APPLICABLE VEHICLES)

If there are vacant switch locations on the cluster, a switch from the center panel view can be relocated to one of these locations. To accomplish this:

1. Click on the switch in the Center Panel view.
2. Drag the switch onto the Cluster tab and wait for the Cluster tab to open. (Do not drop the switch yet.)
3. Drag the switch onto the Cluster view and drop it onto the desired vacant location.

Switches can also be moved from the cluster to vacant locations in the center panel.

**NOTE – DLB will only let you move a switch to a configurable location.**

**NOTE – Any switch located on the cluster will be activated with the key in the OFF position. This provides a risk of running down the battery if the switch is left ON.**



0000410570

Figure 125 Cluster Tab with Two Vacant Switch Locations (Lower-Left)

### MOVING GAUGES

The Cluster tab and, on some vehicles, the Center Panel tab allow the user to view the vehicle cluster gauge and warning light arrangement, as populated by the features enabled in the vehicle configuration. The gauge positions identified with a BLUE circle are for optional gauges (which may be moved). All other gauges and warning lights have a fixed position. Full view of the gauge cluster is accomplished via movement of the horizontal and vertical scroll bars.



0000410570

Figure 126 Cluster Tab with Two Vacant Gauge Locations (Left)

**NOTE** – On some models manufactured in 2017 and later, none of the gauges are moveable.

To move an optional gauge:

1. Drag and drop the gauge to an empty gauge location (BLUE circle).
2. Save changes by doing one of the following:
  - In the menu bar, select File > Save.
  - In the toolbar, click the Save icon.



**Figure 127 Save Icon**

3. Program the changes into the vehicle (page 119).

### MOVING SIGNALS TO DIFFERENT CONNECTOR PIN LOCATIONS

There is some latitude to relocate signals to different connector locations on the BC / ESC and the Remote Power Modules. This capability is limited to relocations that are configurable and are permitted by your DLB programming level.

DLB will generate an error message if you try to move something where is not permitted.

To move a signal:

1. Drag and drop the desired signal from its current location to a vacant location.
2. Save changes by doing one of the following:
  - In the menu bar, select File > Save.
  - In the toolbar, click the Save icon.



**Figure 128 Save Icon**

3. Program the changes into the vehicle (page 119).

### Errors

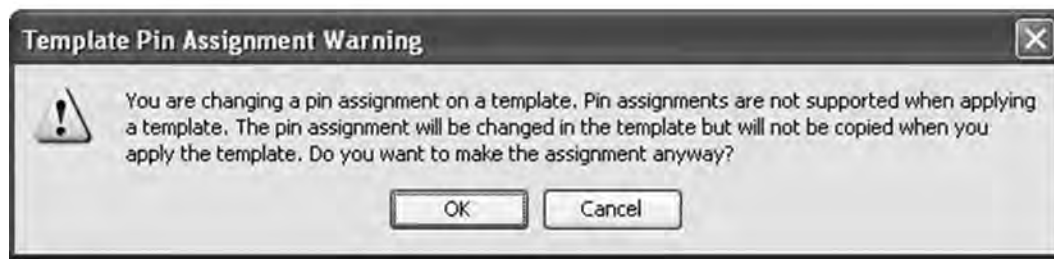
If you do not have sufficient permissions to make the change, the following error will be displayed.



0000410575

**Figure 129 Pin Mapping Error**

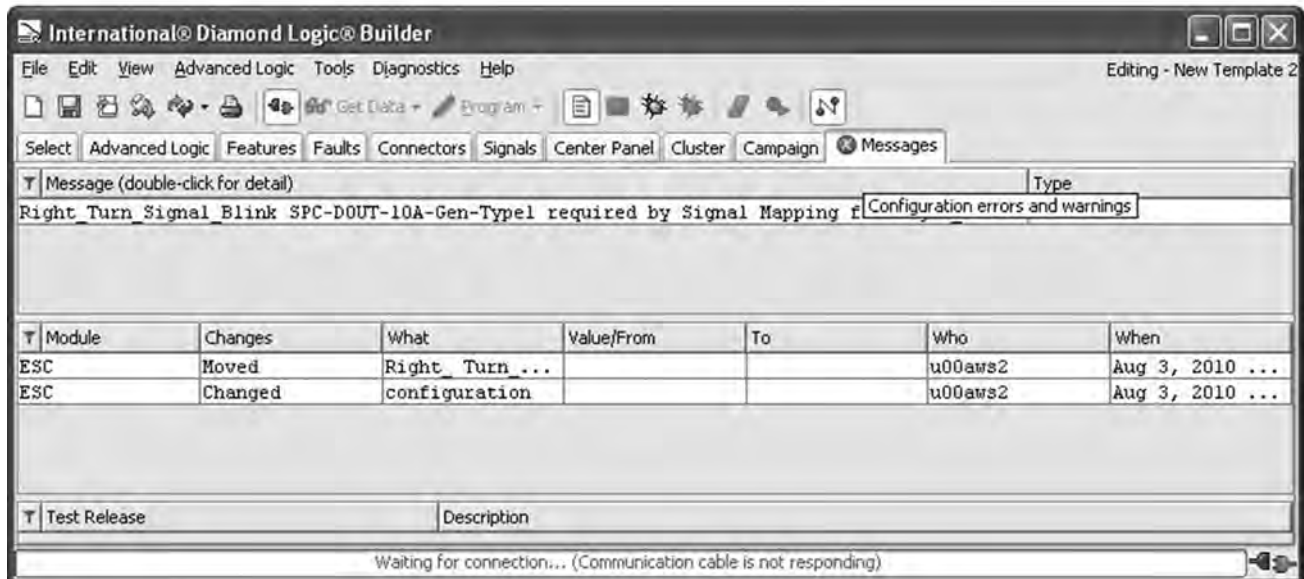
If you try to change pin assignments on a template, the following message appears.



0000410576

**Figure 130 Template Pin Assignment Warning**

Additionally, new messages that advise why the move is generating an error may appear on the Messages tab.



0000410577

**Figure 131 Error-related Messages on Messages Tab**

## Use Default

The Use Default option in the Edit menu will return connector pin mapping, parameter values or switch and gauge locations to the default settings. This can be helpful when configuration conflicts occur. Use this carefully and be sure to compare anything that might have changed in the DLB interface to your desired configuration.

**NOTE – Using the Default Pin Mapping function may undo any custom pin locations.**

**NOTE – Using the Default All option may help to clear an error message that shows up in the Messages tab. Use caution to ensure that any undesired changes were not made.**

# PROGRAMMING A VEHICLE

## MODULE PROGRAMMING

DLB can be used to do the following:

- Program changes that add or remove BC / BCM features and parameters
- Change switch and gauge locations
- Update module kernel versions
- Update switch pack kernel version and assign pack addresses
- Configure the Tire Pressure Monitoring System (TPMS)

The BCM programming is made up of the following discrete software components:

- Base Kernel Program
- Configuration Program, consisting of Features and Logic Blocks
- Programmable Parameter file

If the kernel program on the BC / BCM already contains the latest version available from Navistar, only the configuration file and programmable parameters would be loaded into the vehicle.

Only VIN files may be programmed into a vehicle. Templates must be applied to a VIN file, saved, and then the updated VIN file may be programmed into the vehicle.

**NOTE – Prior to attempting to program the BC / BCM, ensure that the battery is charged to a least 13 volts and the dome light or park lights are on.**

**NOTE – Key must be ON when the programming includes updating the Light Control Module or Switch Pack modules.**

**NOTE – Prior to programming, vehicle modules should be updated to the latest kernel.**

1. Connect the vehicle to the computer using an interface cable. Refer to the CONNECTING TO THE VEHICLE section for detailed instructions.



**Figure 132 Computer Link Icon**

2. Click the Computer Link icon in the toolbar.
3. Verify that the connection is established by checking the icon in the lower-right corner of the window. This icon should show that the vehicle is connected.



**Figure 133 Computer Link Connected**



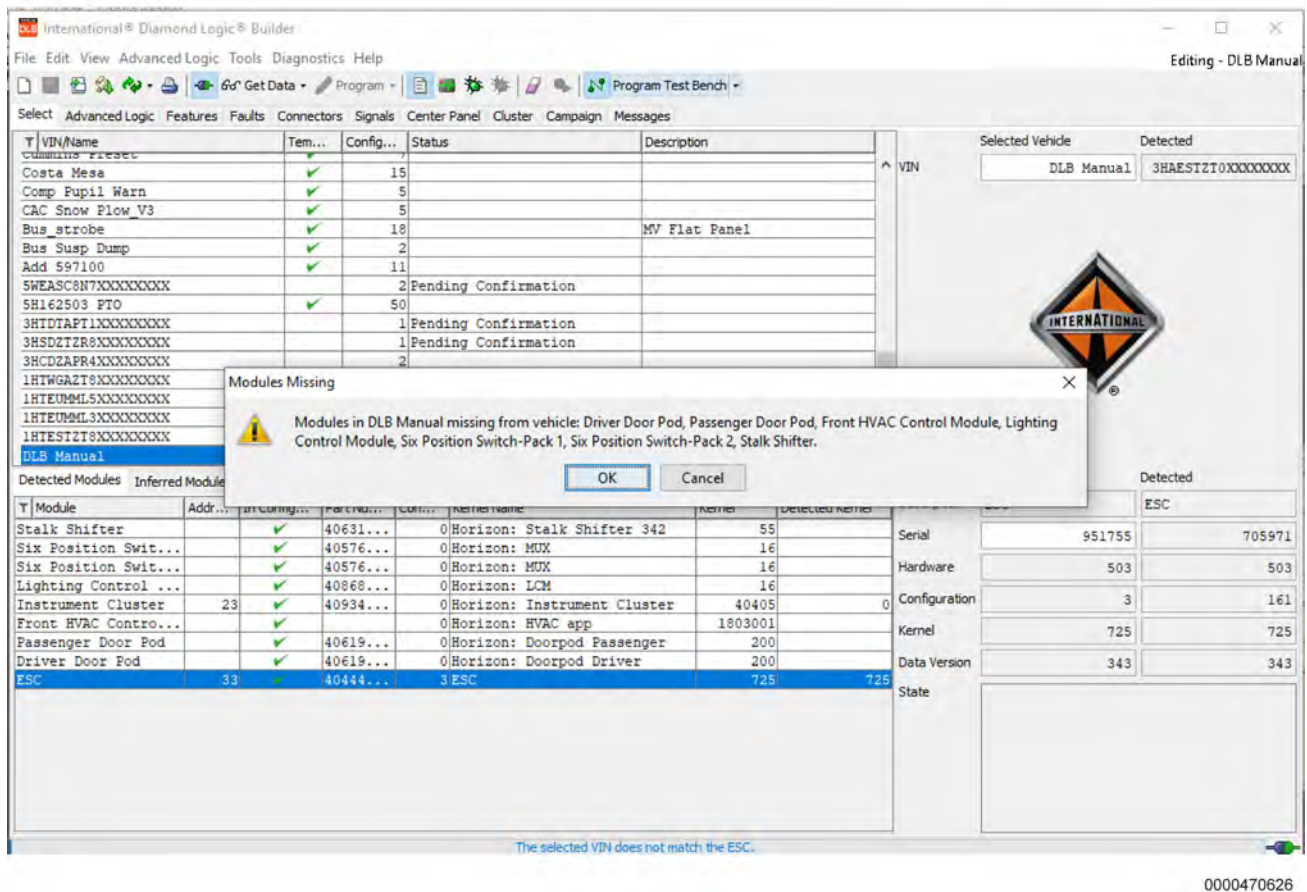
**NOTE – If you are programming a replacement BC / BCM, a message will appear warning that the BC / BCM serial number of the Selected BC / BCM and the Detected BC / BCM do not match.**

- Click OK to allow DLB to change the serial number on the selected VIN. This will marry the new BC / BCM serial number to the BC / BCM and update the VIN database in the Navistar system.



**Figure 134 Program Icon**

- Click the Program icon in the toolbar.



**Figure 135 Warning Message**

**NOTE – Items and functions displayed in the DLB software will be based on user access level.**

The message above will be displayed if programming is attempted with the key OFF. Programming is not recommended to program with KEY OFF. Programming with KEY ON will update all modules as required.



Figure 136 Programming Status

The system will load the VIN configuration file into the vehicle. The status bar will display the slider bar showing programming status.

**NOTE – Do not interrupt while the program is loading.**

- 6. Once all required sections of the VIN configuration files are loaded, the status bar will indicate that the system is resetting. The vehicle is now programmed.

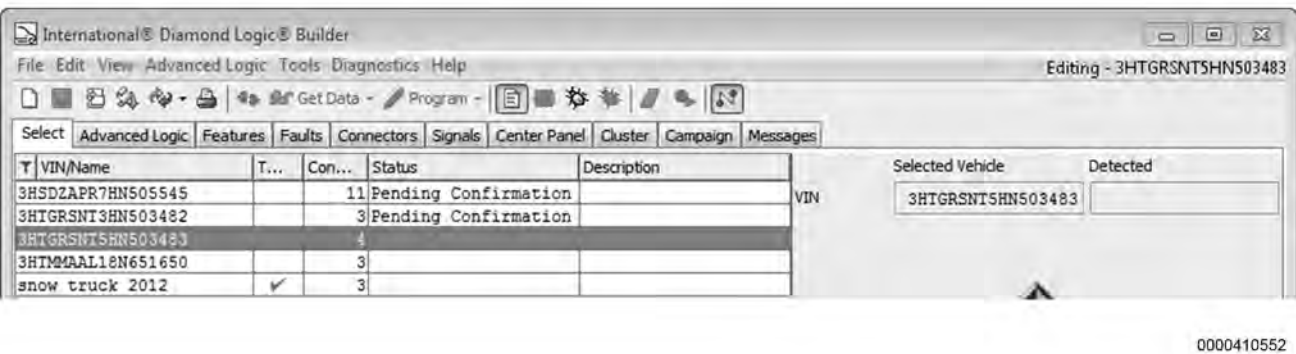


Figure 137 Status Column Empty

Notice that the Status column is now empty for the programmed vehicle.

After a vehicle has been programmed, while not connected to the internet, the user must connect to the Internet and launch the Diamond Logic® Builder software. Connecting to the Internet will allow the Diamond Logic Builder program to save the revised.

VIN configuration file in the archive at Navistar. For this reason, Navistar suggests making a connection to the Internet at least once a day, if the user has programmed any vehicles.

**NOTE – It is highly recommended that you print the vehicle configuration whenever modifications are made. These modifications include (but are not limited to): adding, deleting, moving, or modifying switches, features, advanced logic, or outputs / inputs on the connectors.**

The printed vehicle configuration should be stored with the vehicle for future reference in diagnostics, repair, and modification or reprogramming.

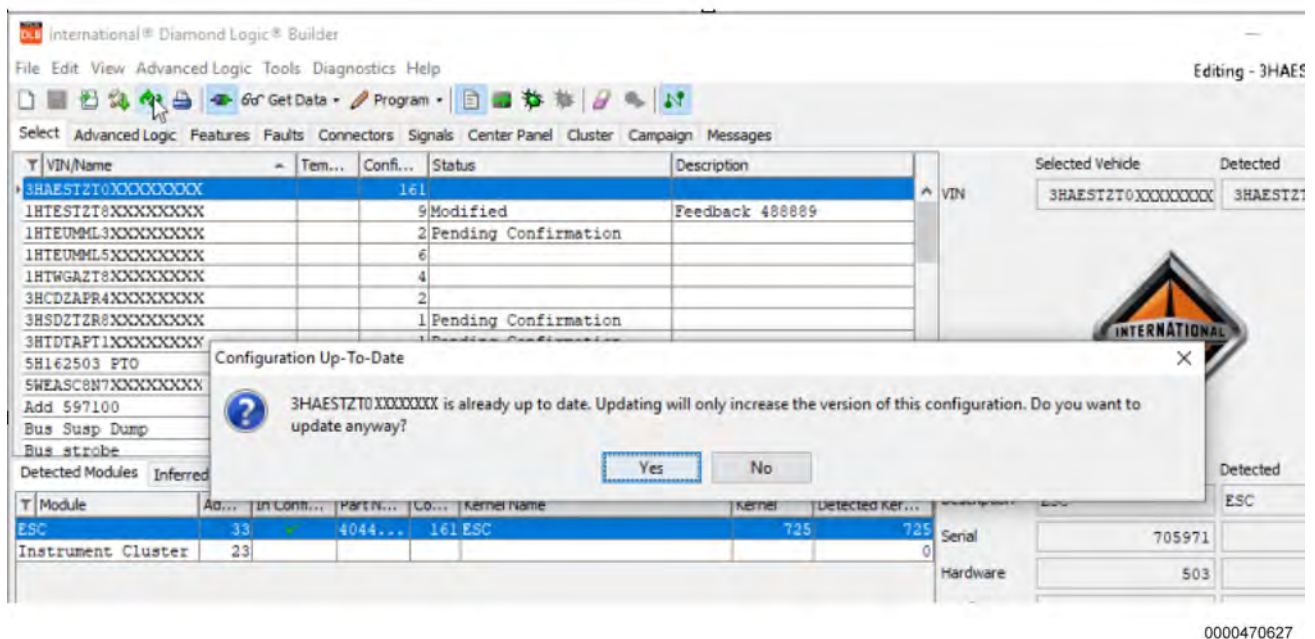
## MODULE UPDATING

The Diamond Logic® Builder software can be used to update the Kernel on modules that are detected on the truck data links.

**NOTE – Switch Pack Module updating is accomplished by using the switch pack Programming option under the Tools menu.**

There are two options that allow users to manually update module software that is capable of being updated:

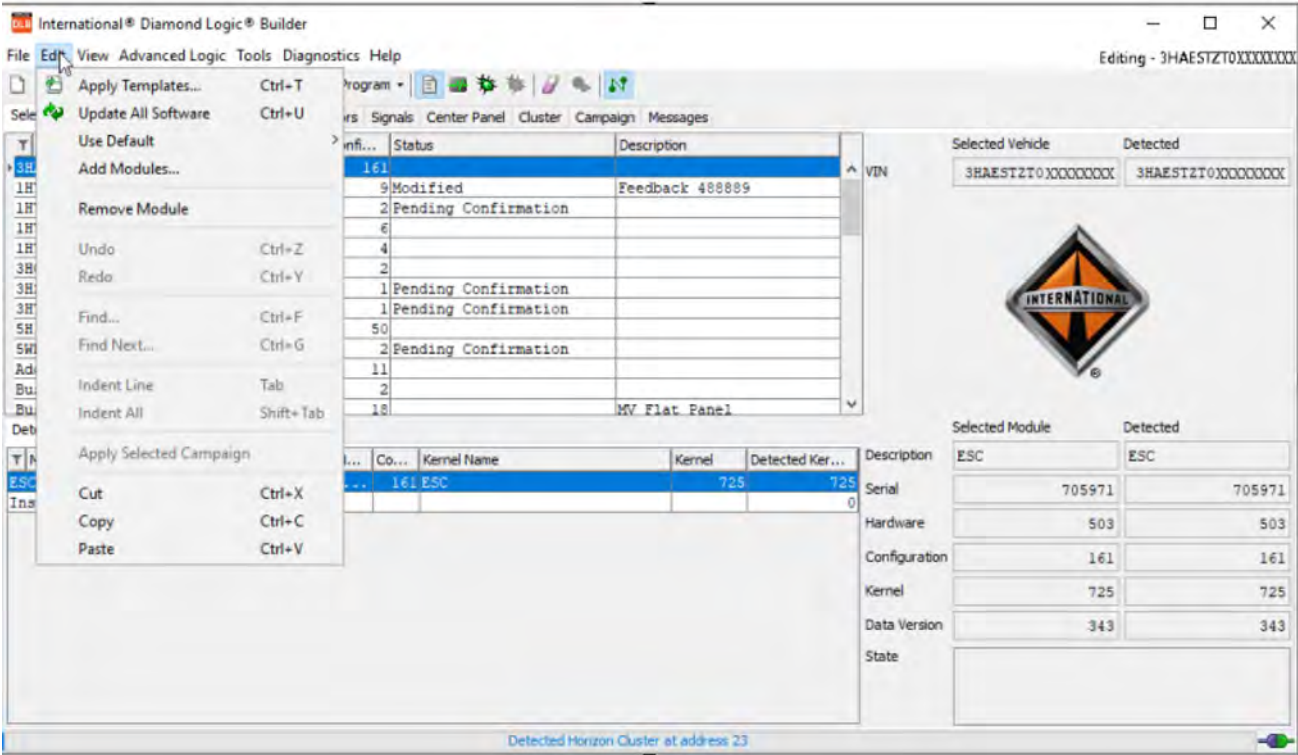
- Update All Icon
- Update All Software option in the Edit menu



**Figure 138 Update All Icon**

If the BCM is already at the latest kernel, a message will be displayed, asking if you want to update the BCM anyway.

# PROGRAMMING A VEHICLE



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Figure 139 Edit Menu

**NOTE – Items displayed in the edit menu will be different based on user access level.**

There is also one option in the menu bar that allow users to update module software:

- Select EDIT, then Update Software, then Update All Software to update all modules that are capable of being updated.

Modules that are not intended to be updated or programmed can be removed.

1. In the lower section of the Select tab, select the Detected Modules sub-tab.
2. Right-click on one of the Detected Modules to see the drop down menu shown below.

Detected Modules		Inferred Modules		Data Log				
T	Module	Addr...	In Config...	Part Nu...	Con...	Kernel Name	Kernel	Detected Kernel
	Stalk Shifter			40631...	0	Horizon: Stalk Shifter 342	55	55
	Six Position Swit...			0576...	0	Horizon: MUX	17	17
	Six Position Swit...			0576...	0	Horizon: MUX	17	17
	Lighting Control ..			0868...	0	Horizon: LCM	18	18
	Instrument Cluster			0934...	0	Horizon: Instrument Cluster	40405	40405
	Front HVAC Contro...		✓		0	Horizon: HVAC app	1803001	1803001
	Passenger Door Pod		✓	40619...	0	Horizon: Doorpod Passenger	200	200
	Driver Door Pod		✓	40619...	0	Horizon: Doorpod Driver	200	200
	ESC	33	✓	40444...	8	ESC	725	725

0000470629

Figure 140 Detected Modules Right-Click Menu

3. Select the desired option. Any module that is not grayed out can be selected.
  - The Remove Module option will remove the module from the Detected Module list and prevent that module from being updated or programmed.
  - The Reboot Module option will reboot a module that can be rebooted.



### SWITCH PACK PROGRAMMING

**NOTE – The Body Control Module (BCM) software must be at Data Version 324 or higher to support programming the switch pack software.**

If the functionality of one switch pack has relocated to another switch pack, please follow programming procedures to correct the issue. The modules will no longer be plug and play. Programming is required if you add or replace a switch pack, or if you want to update the old switch pack programming to the new programming. Programming the switch pack software is a stand-alone programming function in DLB.

You will need to program and assign the source address to the switch pack modules for them to function properly. All switch packs must have the same kernel.



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- |   |   |
|---|---|
| 1. Switch pack 1 with source address<br>151 | 3. Switch pack 3 with source address<br>153 |
| 2. Switch pack 2 with source address<br>152 |   |

**Figure 141 Switch Pack Locations**

When the switch packs reverse or flip, the switch pack's original source address (Figure 141) will be reassigned to one of the other addresses.

**Symptoms**

<b>DTC / Light</b>	<b>Description</b>
33 – SPN 516527 FMI 13	Switch Configuration Mismatch
33 – SPN 516528 FMI 13	Switch Configuration Mismatch
33 – SPN 687 FMI 2	Forward Rear Diff Lock Switch Error
33 – SPN 691 FMI 2	Power Divider Lock Switch Error
33 – SPN 986 FMI 2	Engine Fan Switch Error

Faults will vary based on switch content and configuration. Some possible faults are listed in the chart.

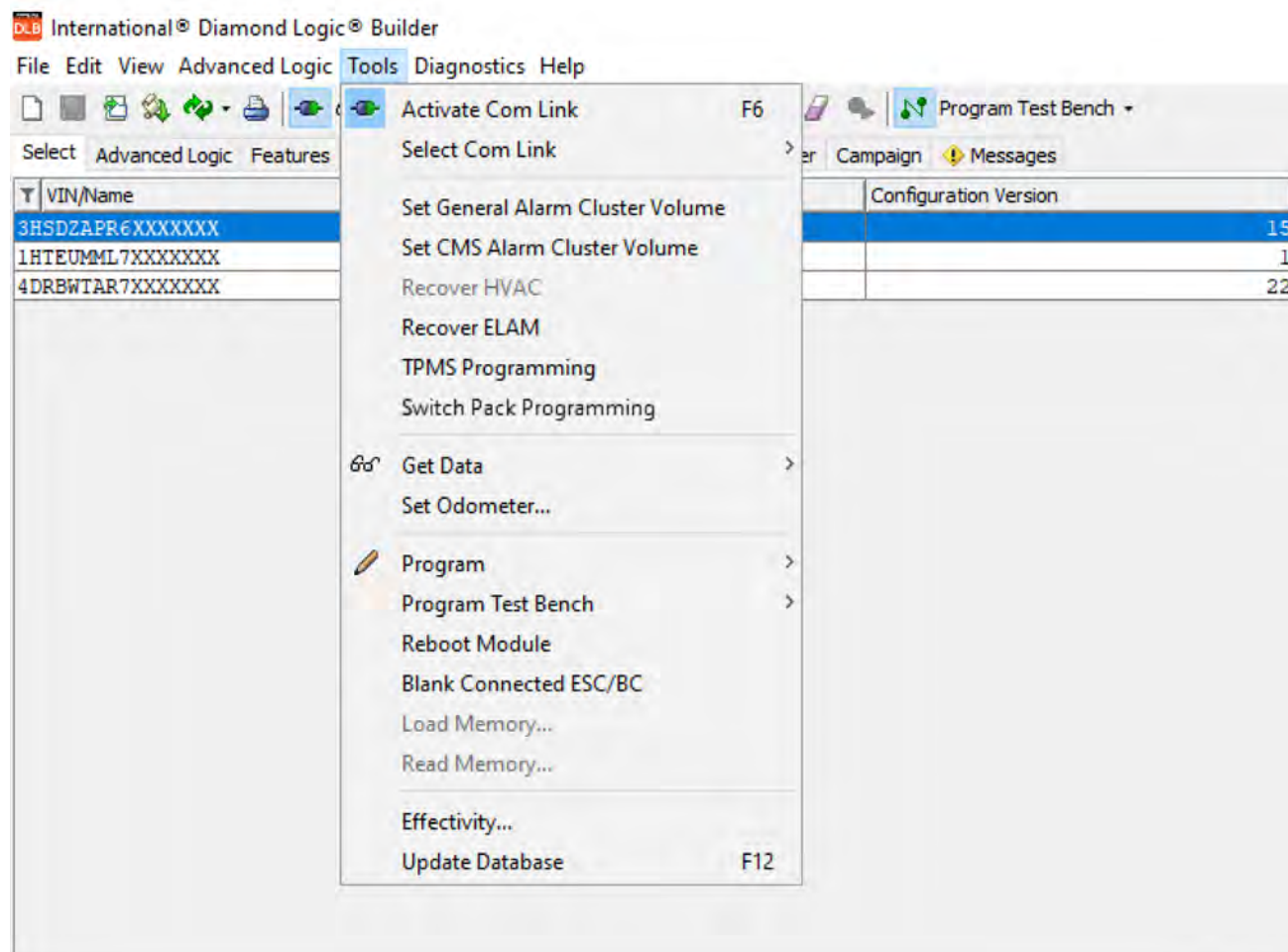
**NOTE – If switch packs are flipped and programming is not available, unplug the switch pack 1 for 30 seconds, then plug it back in. This will force all switch packs modules to perform a source address claim at their current software level and will restore functionality. Disconnecting the batteries will also work to force the switch pack modules to perform a new source address claim. There may be truck power conditions that cause the switch pack operations to be flipped from one switch pack to the other. This can create extremely undesirable conditions.**

Customer observations or concerns are as follows:

- Switch pack switches are flashing RED
- Switches may operate a function of a different switch pack

Example: A switch in switch pack 1 may operate as the switch directly below it in switch pack 2.

## PROGRAMMING A VEHICLE



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**Figure 142 Tools Menu**

Programming is required to do one of the following:

- Add or replace switch pack
- Update old switch pack base software kernel to latest kernel
- Adjust source addresses on installed switch packs

You will need to program and assign the source address to the switch pack modules for them to function properly. All switch packs must have the same kernel.





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1. Switch pack number one with source address 151
2. Switch pack number two with source address 152
3. Switch pack number three with source address 153

**Figure 143 Moving Switch Pack Locations**

#### Updating Switch Pack Software (Kernel) Using DLB

Updating the software in the switch pack base, which controls how the switch pack module operates, including fixed module source address.

**NOTE – Moving switch locations and updating the switch pack software are not the same thing.**

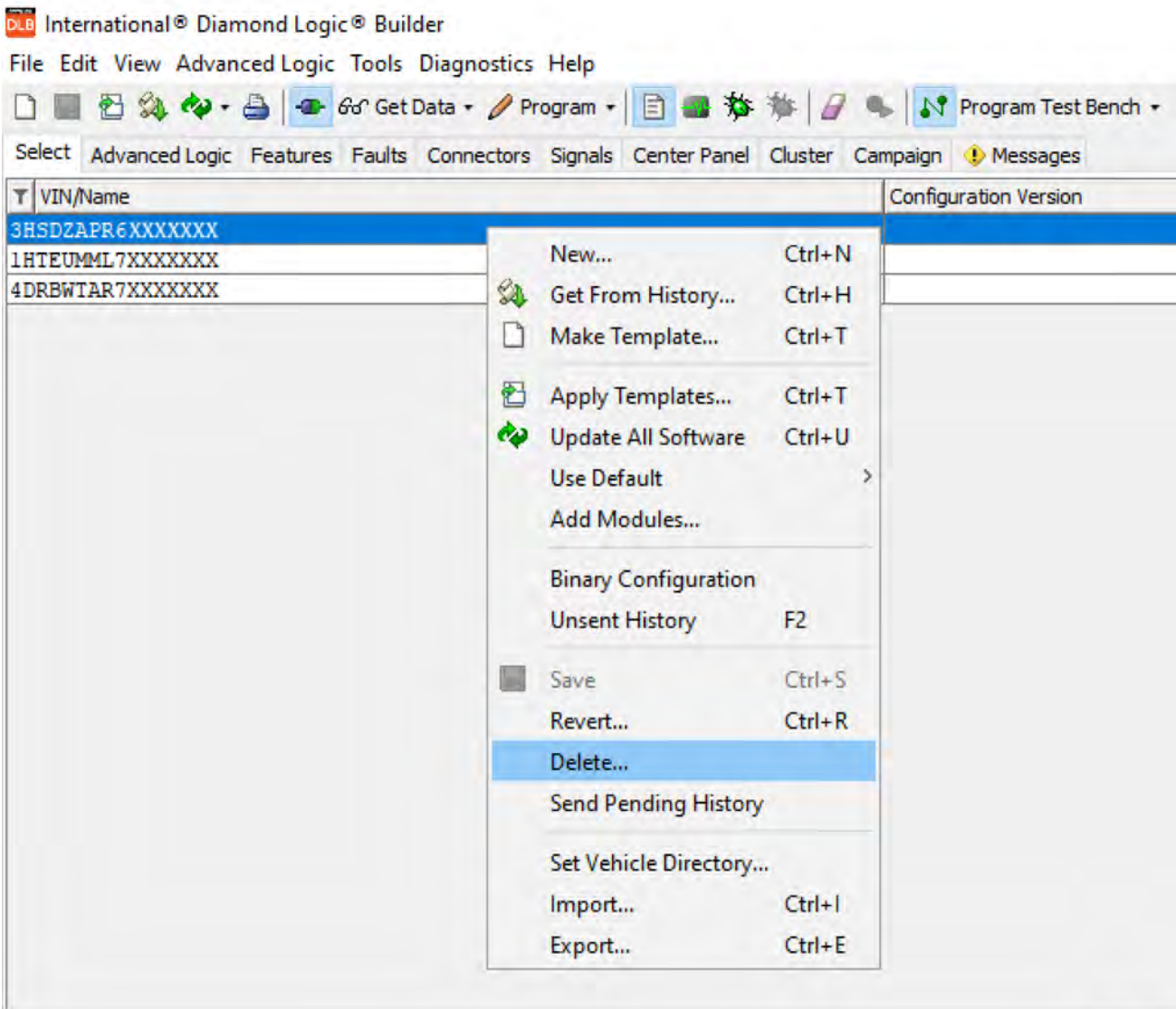
- Programming software (kernel) within the switch pack base is a function in DLB
- This is not related to moving switch locations
- The procedure to update the switch pack base software (kernel) is being covered in this section

PROGRAMMING A VEHICLE

Diagnostic Steps

Part One – Check existing switch pack software in vehicle

- 1. If you are replacing a switch pack, check the kernel version of the parts that are currently installed in the vehicle, as well as the kernel of the new part.



0000470632

Figure 144 VIN Delete

**NOTE – Items and functions displayed in the DLB software will be based on user access level.**

- 2. Right-click on the VIN that you are connecting to, if present.
- 3. Select DELETE.

4. Read the vehicle with DLB. Refer to Connecting to the Vehicle page 18 section.

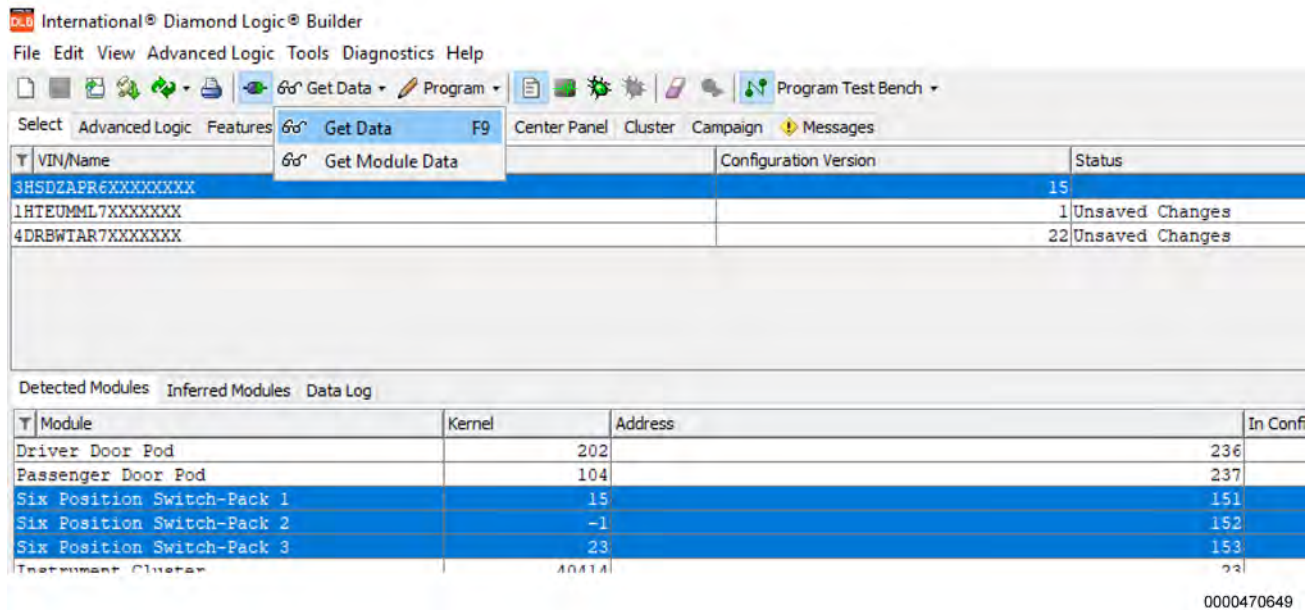
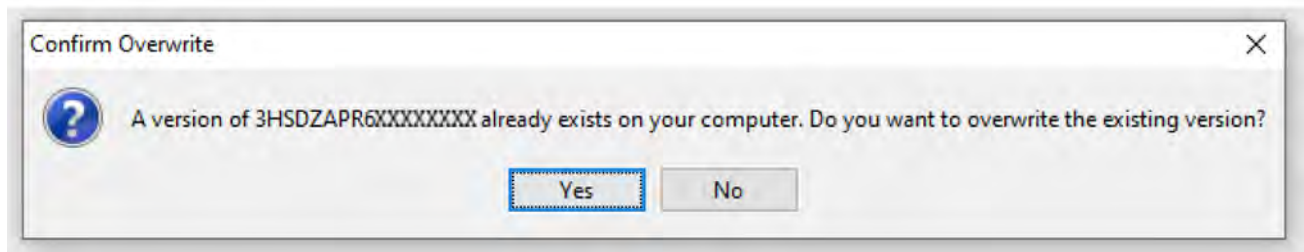


Figure 145 Get Data Function



0000470650

Figure 146 Get Data Function

5. Key ON.
6. Select GET DATA to ensure the module data that you are seeing is accurate.

Note which kernel is being displayed for the Six Position Switch-Packs.

- 23 or 17 or lower (kernel 23 is identical to kernel 17) - These kernels are subject to the complaint of switch packs flipping or switches operating other features.
- 24 or higher

## PROGRAMMING A VEHICLE

### Part Two – Check replacement part switch pack software that you will be installing in the vehicle (if applicable).

1. Unplug switch pack 1.
2. Plug the replacement switch pack into the truck harness.
3. Leave the remaining switch packs unplugged. There will only be the single replacement switch pack plugged into the truck harness.
4. Unplug the pigtail from the last switch pack and plug the pigtail of the replacement part back into the truck harness (YELLOW and GREEN wires).
5. Connect with DLB and get the module data and check the kernel displayed to determine programming path to follow.
  - 23 or 17 or lower (Kernel 23 is identical to Kernel 17) - These kernels are subject to the issue of switch packs flipping or switches operating other features.
  - 24 or higher

Determine the Programming Path to Follow	
Updating modules from Kernel 23 or 17 or lower (no parts being replaced, or service part is also at Kernel 23 or 17 or lower) page 133	Replacing switch pack - Existing truck switch packs are at Kernel 23 or 17 (or lower). Replacement part is at Kernel 24 (or higher) page 140
Replacing switch pack - Truck switch packs are at Kernel 24 (or higher). Replacement part is at Kernel 23 or 17 or lower page 148	Replacing switch pack - Existing truck switch packs are at Kernel 24 (or higher). Replacement part is at Kernel 24 (or higher) page 156

6. If you are adding a switch pack to a vehicle, follow one of the paths listed above. Instead of replacing any parts, you will be adding an additional switch pack. That is, you will still need to determine the Kernel in the switch pack you are adding to the vehicle, and the Kernel in the switch pack(s) currently installed in the vehicle.

Overview of the Switch Pack Software Kernels		
Switch Pack Software Kernel	Concern	Initial Corrective Software
17 or lower	Switch pack source address issue. (Switch Packs flipping, switches operating other features)	Kernel 22
22	Software bugs, VIN fault codes	Kernel 24
23	Switch pack source address issue. (Switch Packs flipping, switches operating other features)  Kernel 23 replaced 22 and is an exact copy of 17	Kernel 24



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1. Switch pack 1 with source address 151
2. Switch pack 2 with source address 152

3. Switch pack 3 with source address 153

**Figure 147 Center Panel Tab Display**

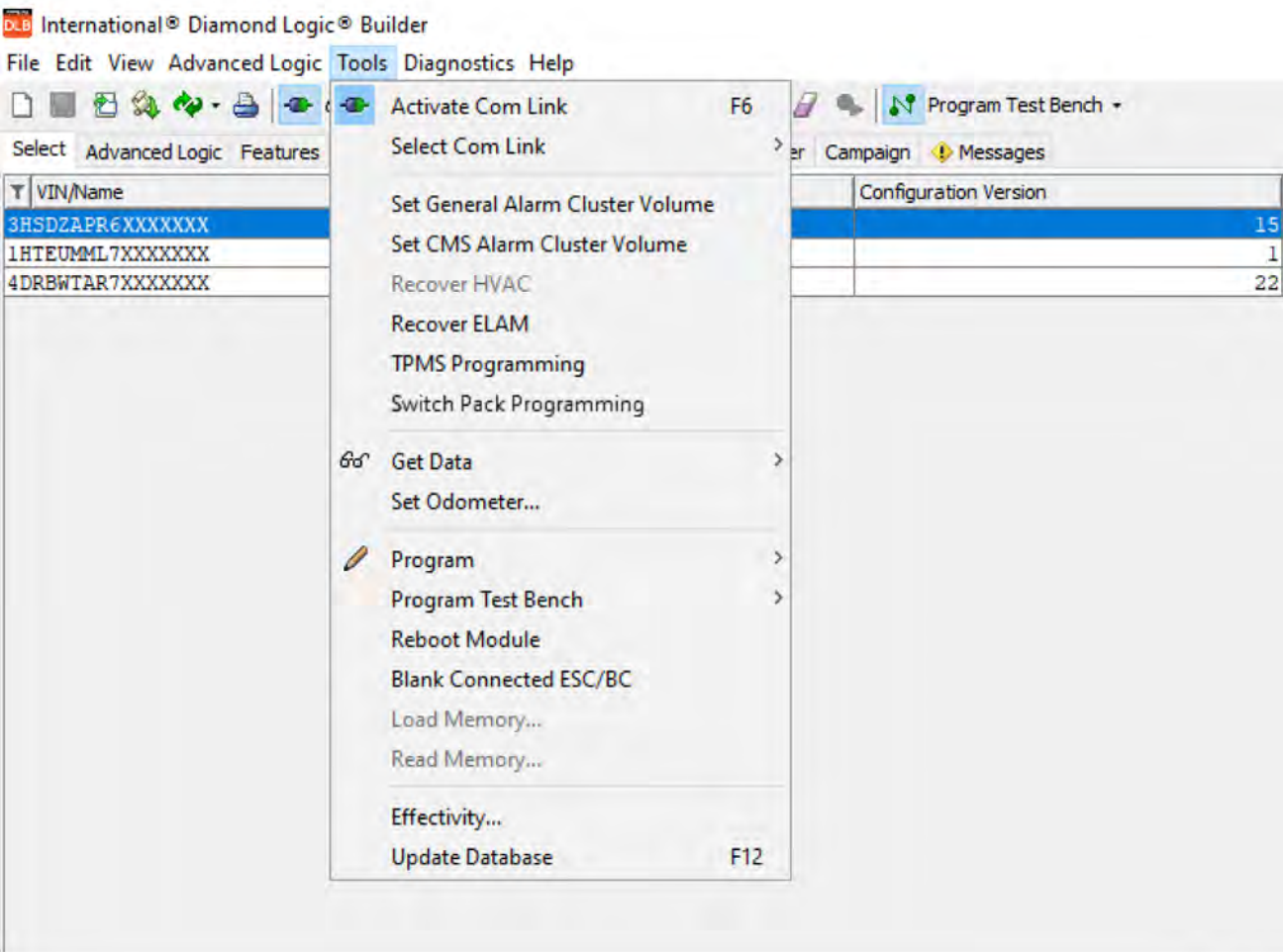
The DLB center panel tab displays switch locations.

# PROGRAMMING A VEHICLE

## Repair Steps

Updating modules at kernel 23, or 17 or lower (no parts being replaced, or service part is also at kernel 23 or 17 or lower).

1. If a switch pack is being replaced, move the switches over to the new switch pack, and plug the switch pack into its proper location in the vehicle. All switch packs should now be functional, and all kernel versions should be 23, or 17 or lower.
2. Key ON.



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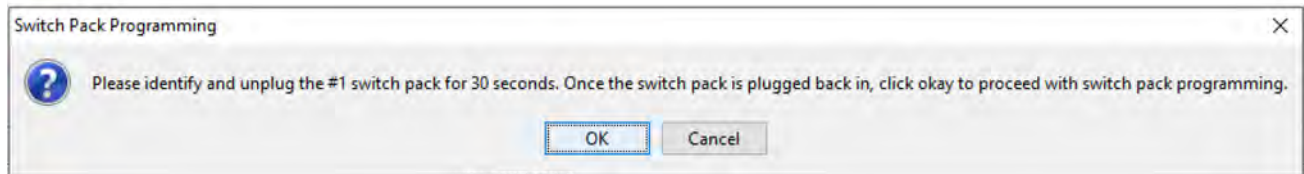
Figure 148 Switch Pack Programming

**NOTE** – Items and functions displayed in the tools menu will be based on user access level.

**NOTE** – The BCM may need to be updated before you can update the switch pack software. If a BCM update is required, DLB will detect this and prompt you to exit switch pack programming and update the BCM first. You will need to return to switch pack programming once the BCM has been updated. If a BCM update is not required, DLB will continue with switch pack programming.



3. Navigate to the Tools menu and select SWITCH PACK PROGRAMMING.

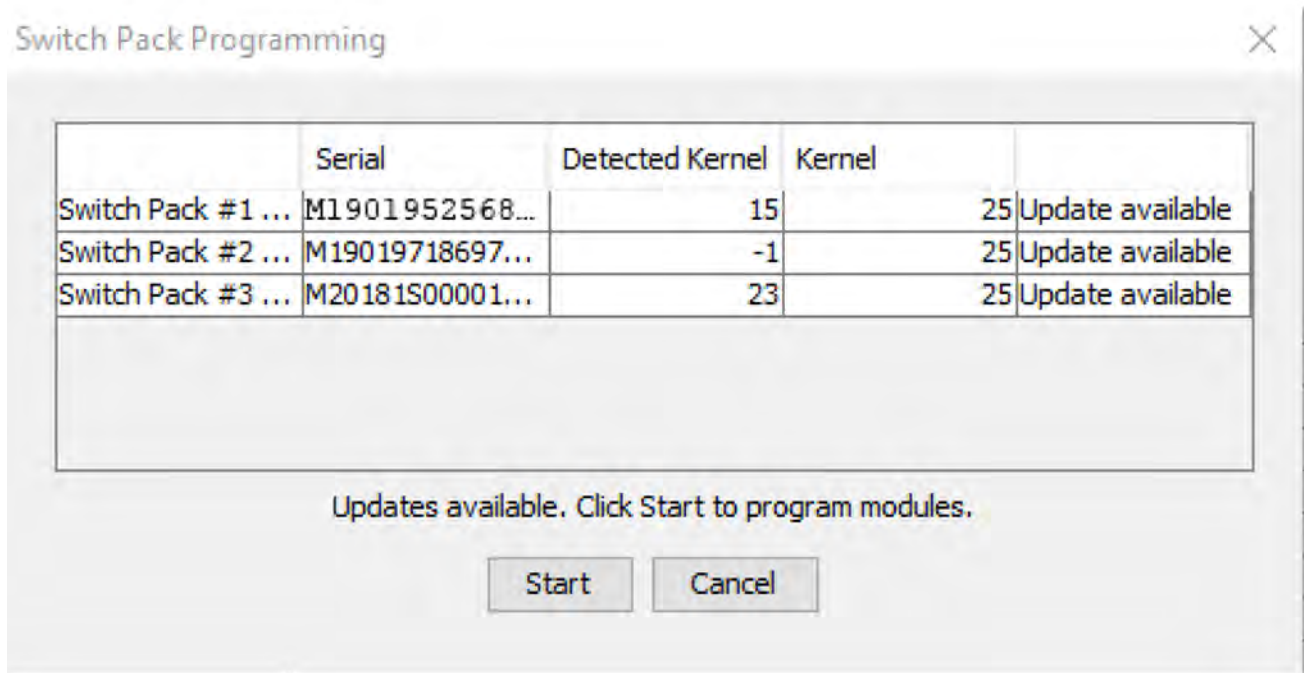


0000470658

**Figure 149 Unplugging Number One Switch Pack**

**NOTE – This step is not required if the vehicle is equipped with only one switch pack.**

4. Unplug switch pack 1. This will force the switch packs to perform a source address claim.

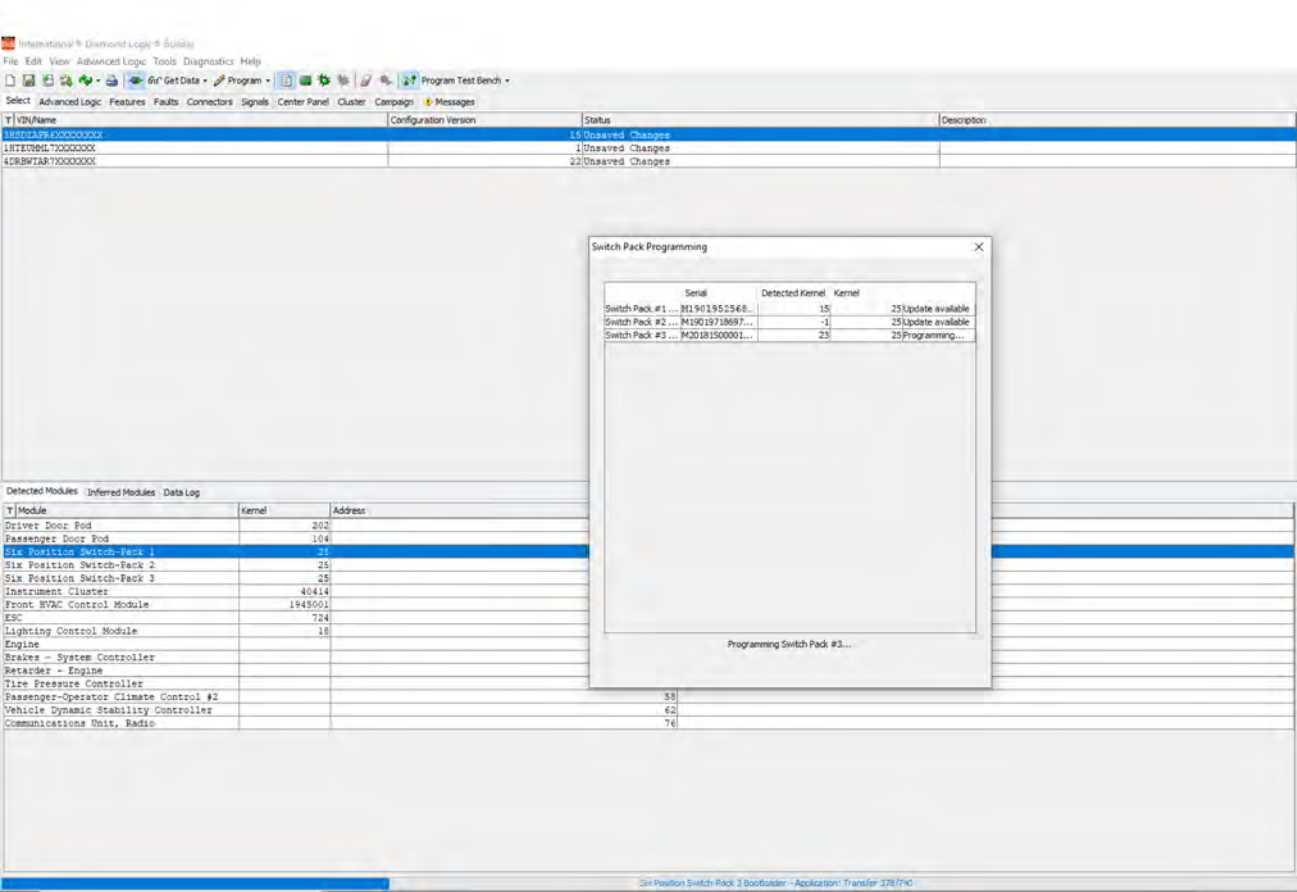


0000470660

**Figure 150 Update Available**

5. Select START to initiate programming.

# PROGRAMMING A VEHICLE

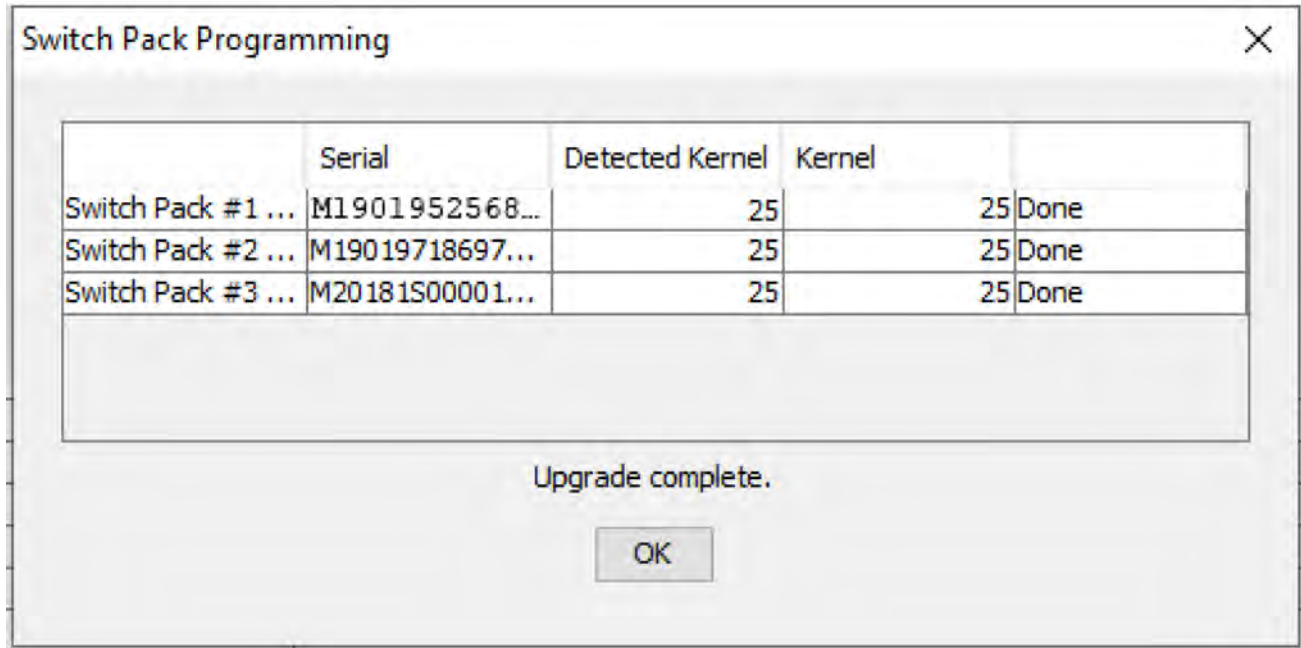


0000470655

Figure 151 Status Bar

The status bar indicates the progress of switch pack programming. All switch packs will be programmed automatically. Each switch pack will take approximately 5 1/2 minutes to complete.

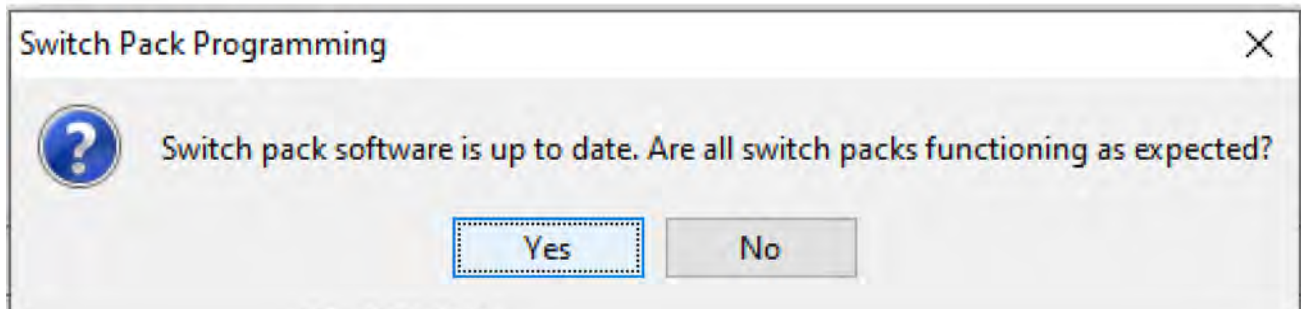




0000470663

Figure 152 Upgrade Complete Notification

You will be notified after the update is complete.



0000470647

Figure 153 Functionality Check

**NOTE – The functionality check allows the user to check operation of each switch pack. This will help ensure that the switch packs were at the proper source address before programming was performed.**

6. Select YES or NO in the functionality check prompt.
  - a. If you select **Yes** - Programming is now complete, no further action is required.
  - b. If you select **No** - A dialogue box opens for you to manually set the source addresses based on the module serial number.

Switch Pack Programming

Switch Pack #1 (addr 151)

M19019718697020046

Switch Pack #2 (addr 152)

NONE

Switch Pack #3 (addr 153)

M1901952568...

Switch Pack #4 (addr 154)

M19019718697020046

Switch Pack #5 (addr 155)

M20181S00001020464

Switch Pack #6 (addr 156)

NONE

Switch Pack #7 (addr 157)

NONE

Switch Pack #8 (addr 158)

NONE

Switch Pack #9 (addr 159)

NONE

Switch Pack #10 (addr 160)

NONE

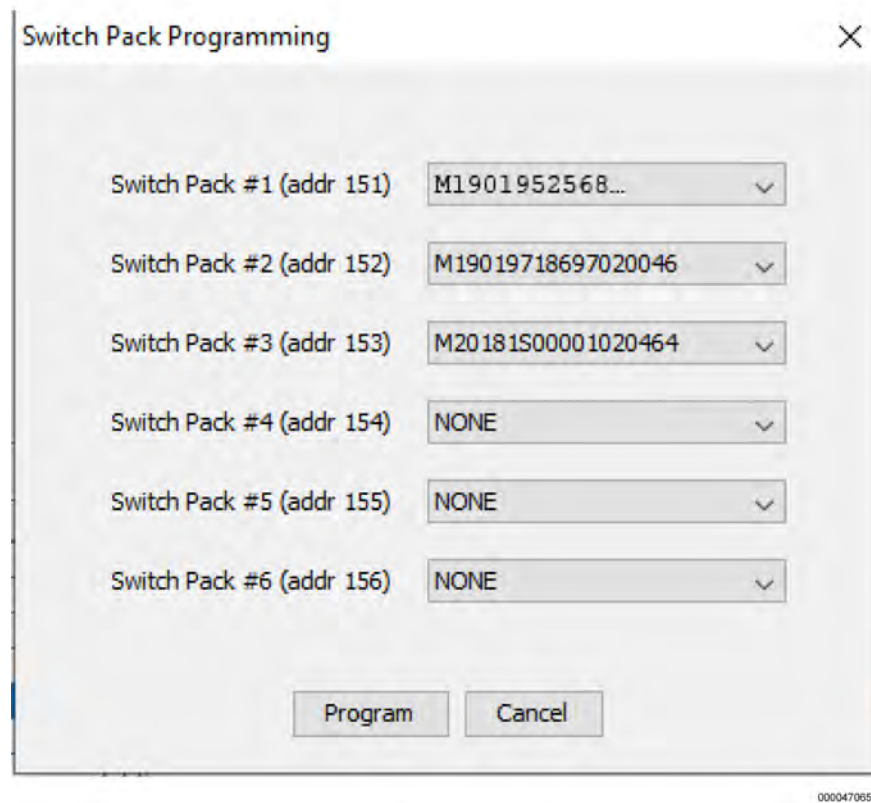
All Switch Packs must have an address.

Program

Cancel

0000470654

Figure 154 Switch Pack Serial Number Menu



The image shows a software dialog box titled "Switch Pack Programming" with a close button (X) in the top right corner. Inside the dialog, there are six rows, each representing a switch pack. Each row consists of a label on the left and a dropdown menu on the right. The labels are "Switch Pack #1 (addr 151)", "Switch Pack #2 (addr 152)", "Switch Pack #3 (addr 153)", "Switch Pack #4 (addr 154)", "Switch Pack #5 (addr 155)", and "Switch Pack #6 (addr 156)". The dropdown menus show the following values: "M1901952568...", "M19019718697020046", "M20181S00001020464", "NONE", "NONE", and "NONE". At the bottom of the dialog, there are two buttons: "Program" and "Cancel".

Switch Pack	Address	Serial Number
Switch Pack #1	151	M1901952568...
Switch Pack #2	152	M19019718697020046
Switch Pack #3	153	M20181S00001020464
Switch Pack #4	154	NONE
Switch Pack #5	155	NONE
Switch Pack #6	156	NONE

0000470552

**Figure 155 Switch Pack Manual Programming**

7. To manually set the source address, use the drop down menu to assign a switch pack serial number to the proper source address. For each switch pack a drop-down displays all three serial numbers. Choose the correct serial number for each location, and then select PROGRAM.

## PROGRAMMING A VEHICLE

International® Diamond Logic® Builder

File Edit View Advanced Logic Tools Diagnostics Help

Get Data Program Program Test Bench

Select Advanced Logic Features Faults Connectors Signals Center Panel Cluster Campaign Messages

VIN/Name	Configuration Version	Status
3HSDZAPR6XXXXXX	15	Unsaved Changes
1HTEUMML7XXXXXX	1	Unsaved Changes
4DRBW7AR7XXXXXX	22	Unsaved Changes

Detected Modules Inferred Modules Data Log

Module	Kernel	Address	In Conf
Driver Door Pod	202	236	
Passenger Door Pod	104	237	
Six Position Switch-Pack 2	25		
Six Position Switch-Pack 3	25		
Six Position Switch-Pack 1	25	151	

0000470640

**Figure 156 Programming Complete**

- Programming is complete. Verify all switch packs are showing they have been updated to the latest kernel.
- Verify one switch from each switch pack operates the correct feature as assigned.

**Replacing switch pack - Truck switch packs are at kernel 23 or 17 or lower. Replacement part is at kernel 24 or higher.**

**NOTE – All switch packs need to be at the same kernel in order to function properly. This section will provide instructions on how to update the switch packs in the vehicle before installing the replacement part.**

**You do not need the serial number of the faulty switch pack that is being replaced**

1. Record the serial numbers of the switch packs in the vehicle, as well as the serial number for the new switch pack that will be installed, and their location.

- Record the location (or source address) with the serial number together. Example: #1 - S/N M20000000181011039, #2 - S/N M20000000181011040, #3 - S/N M2000000018101103941

To complete the upgrade and installation you will need to know the location and serial number to manually set the source address using DLB.

The replacement switch pack will only display the last three digits of the serial number.

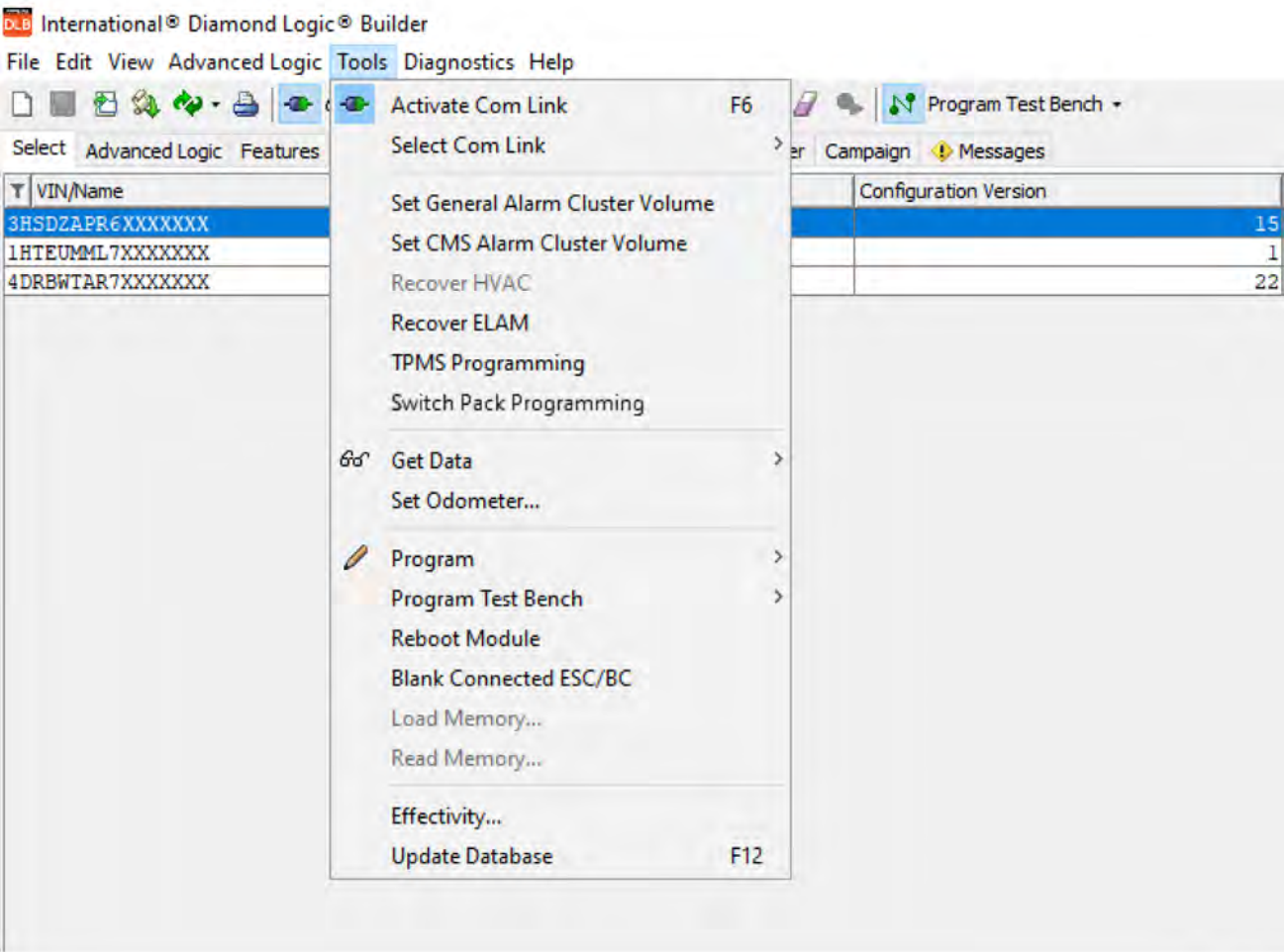
2. Key OFF.
3. Remove the faulty switch pack.
4. Any switch packs that are below the removed switch pack will need to be plugged in, so the daisy chain of switch packs is not broken.

Example: Vehicle has four switch packs. Number two switch pack is being replaced.

- Remove switch pack 2.
- The switch pack 3 will need to be plugged into the switch pack 1 (All three remaining switch packs are now plugged into each other - 1, 3, 4).

5. Key ON.

PROGRAMMING A VEHICLE



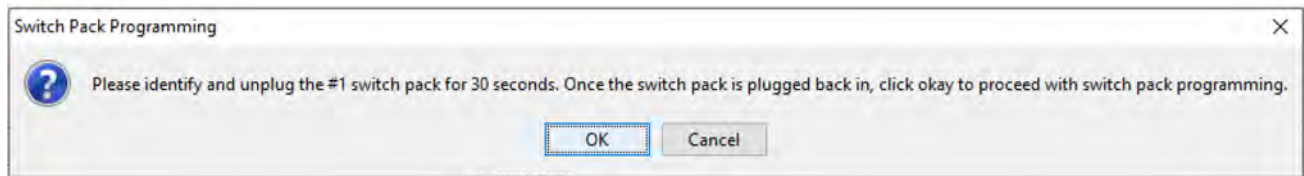
0000470630

Figure 157 Switch Pack Programming

**NOTE –** Items and functions displayed in the tools menu will be based on user access level.

**NOTE –** The BCM may need to be updated before you can update the switch pack software. If a BCM update is required, DLB will detect this and prompt you to exit switch pack programming and update the BCM first. You will need to return to switch pack programming once the BCM has been updated. If a BCM update is not required, DLB will continue with switch pack programming.

6. Navigate to the Tools menu and select SWITCH PACK PROGRAMMING..

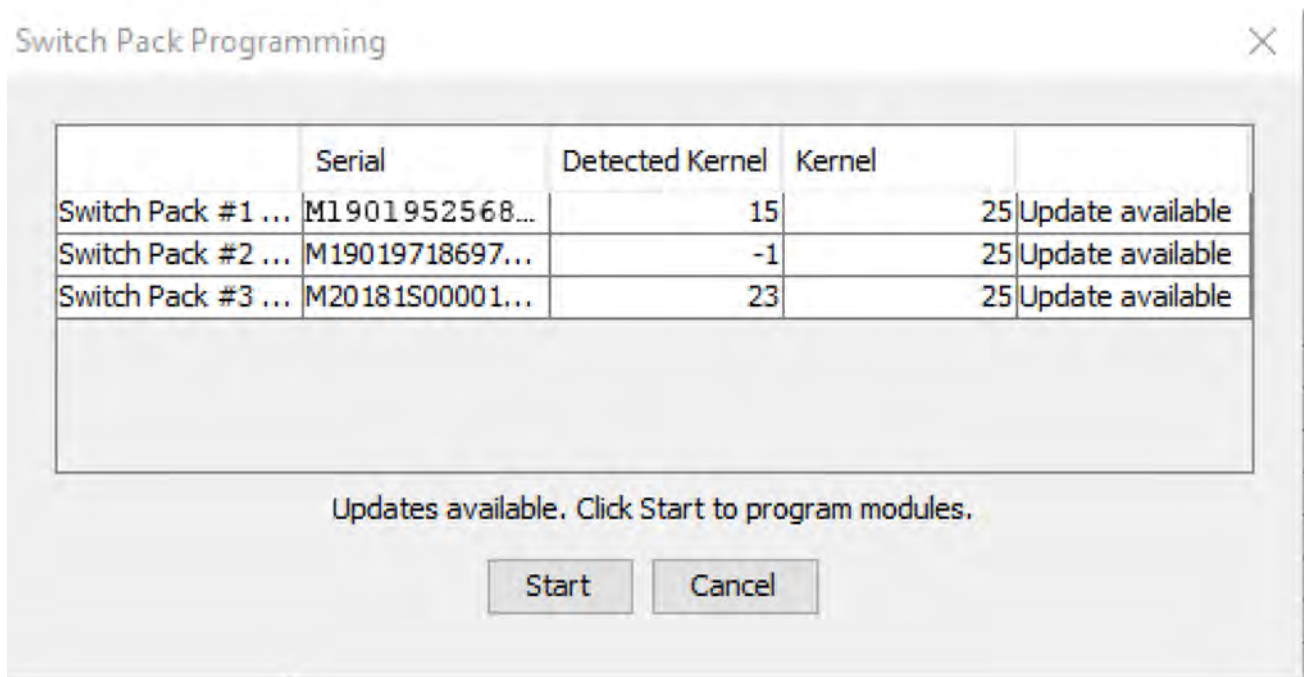


0000470658

**Figure 158 Unplugging the Number One Switch Pack**

**NOTE – This step is not required if the vehicle is equipped with only one switch pack.**

To start the programming process, you are asked to unplug switch pack 1. This will force the switch packs to perform a source address claim.



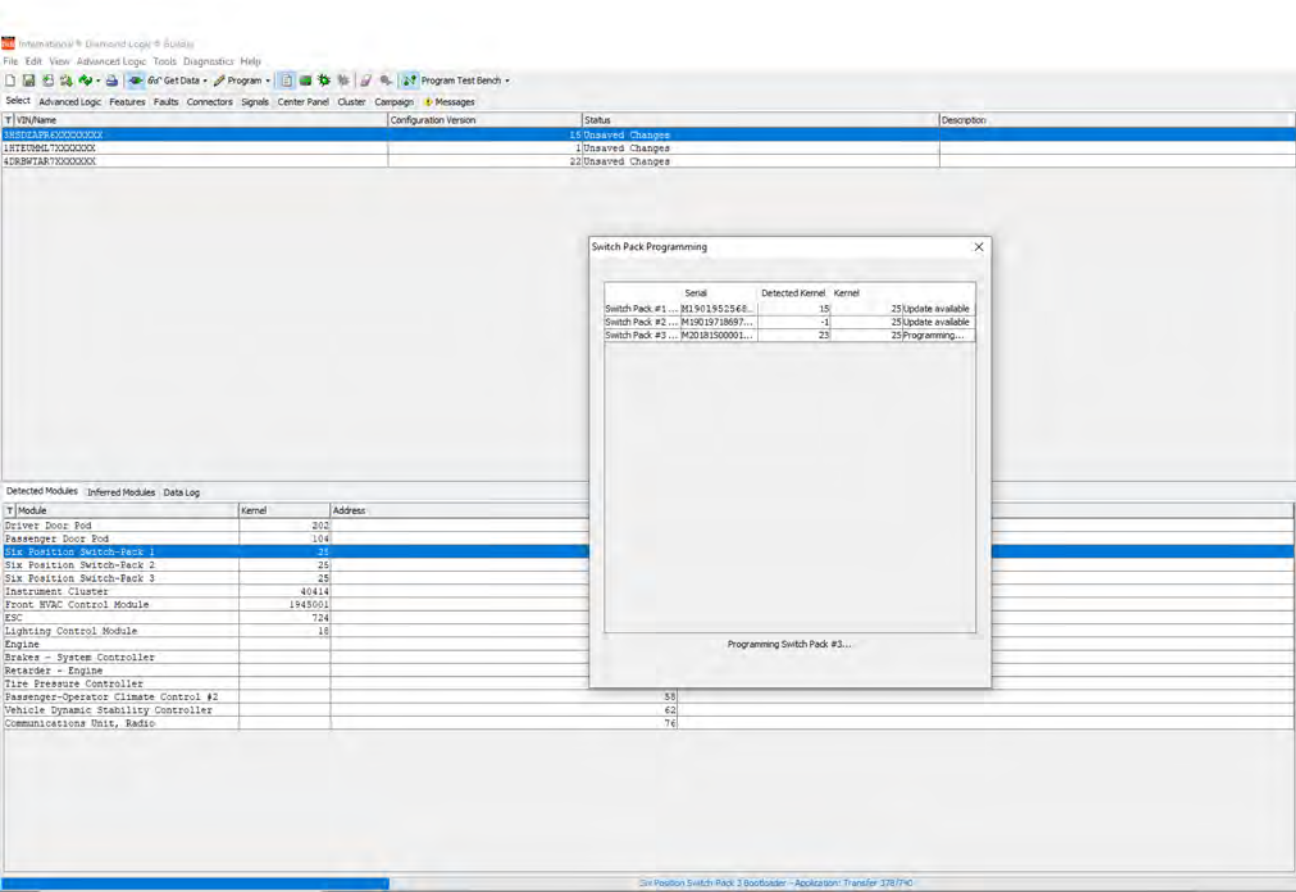
0000470660

**Figure 159 Update Available**

7. Select START to initiate programming.



# PROGRAMMING A VEHICLE

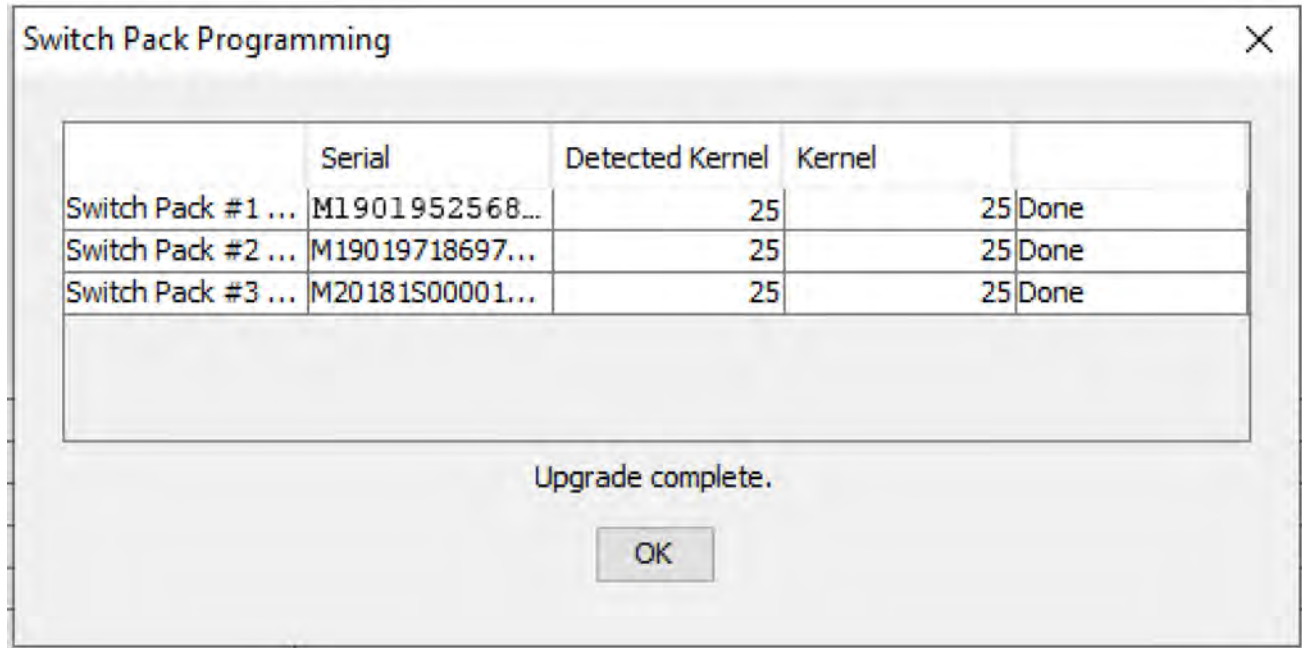


0000470655

**Figure 160 Status Bar**

The status bar indicates programming progress while the switch packs program. All switch packs will be programmed automatically. Each switch pack will take approximately 5 1/2 minutes to complete.





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**Figure 161 Upgrade Complete Notification**

You will be notified after the update is complete.

8. Select OK.

# PROGRAMMING A VEHICLE

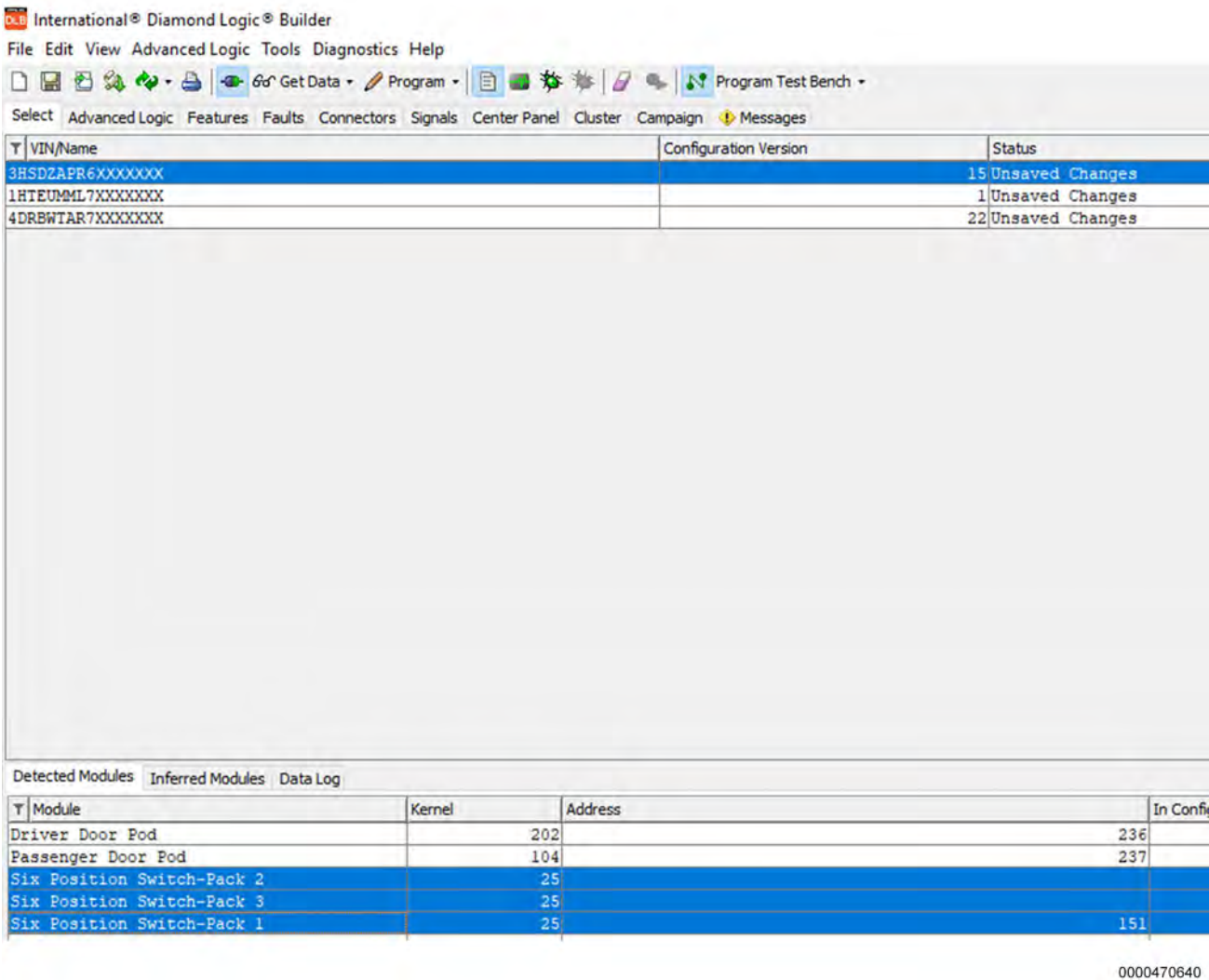
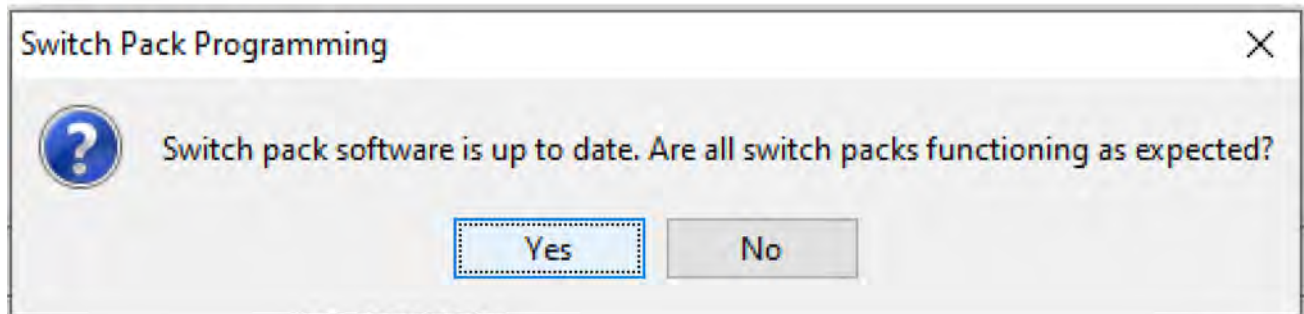


Figure 162 Programming Complete

Programming is complete. All switch packs are showing they have been updated to the latest kernel.

**NOTE – Switch packs may be flashing red, and the replacement part may be non-responsive. This is normal until you manually set the source address.**

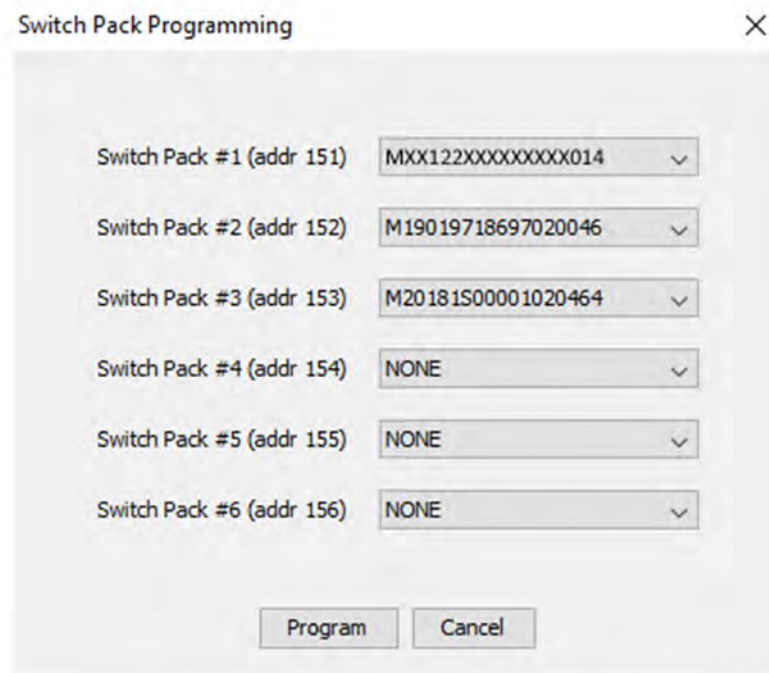
- 9. Key ON.
- 10. Navigate back to the Tools menu and select SWITCH PACK PROGRAMMING.



0000470647

**Figure 163 Setting Source Addresses Manually**

11. Select NO. This will allow you to manually set the source addresses.



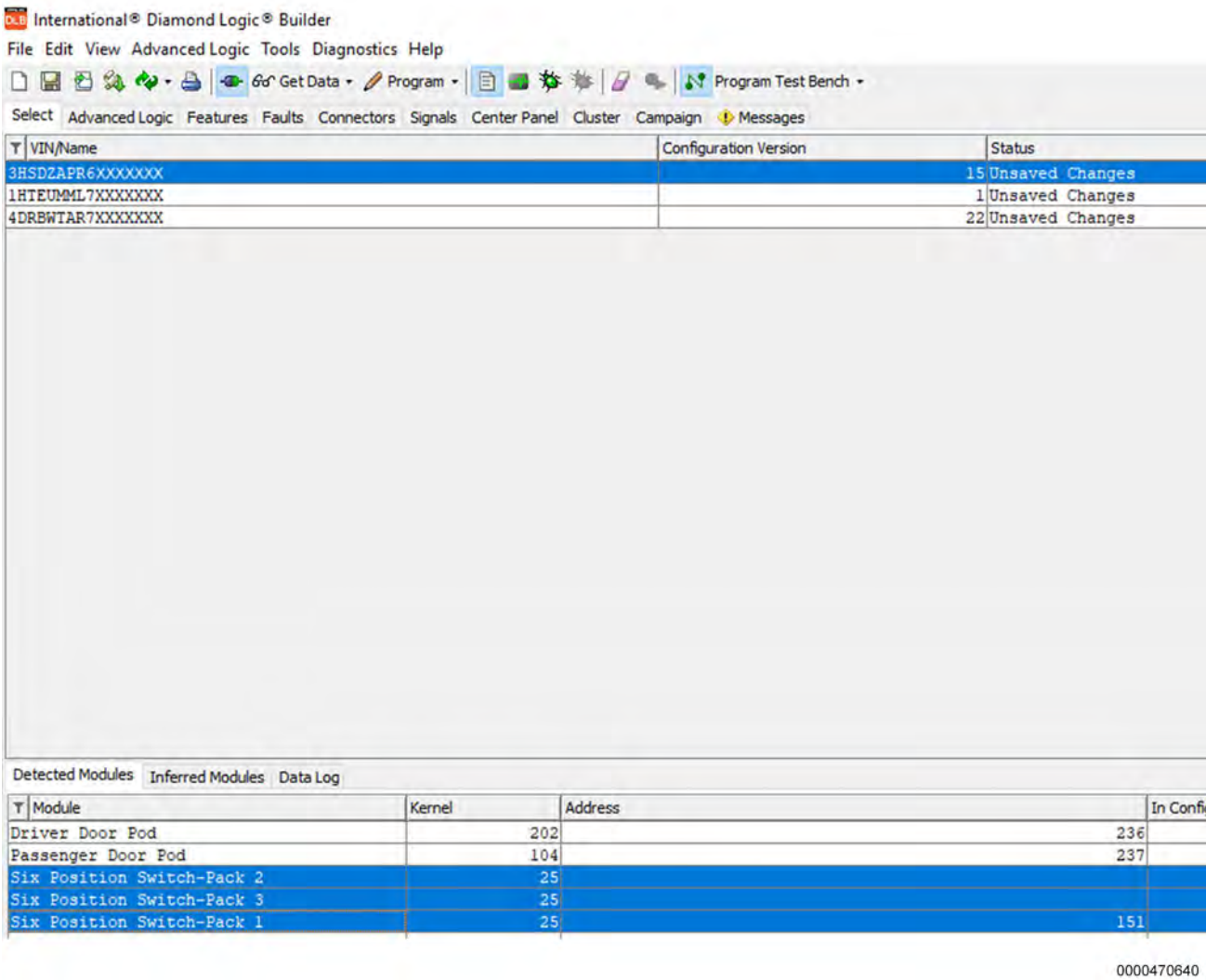
0000470638

**Figure 164 Switch Pack Programming**

Switch pack 1 was replaced. Only a partial serial number is displayed.

12. Set the switch pack source addresses based on their serial number and location in vehicle. Select PROGRAM.

# PROGRAMMING A VEHICLE



**Figure 165 Programming Complete**

- 13. Source address programming is complete. Verify all switch packs are showing they have been updated to the latest kernel.
- 14. Verify that one switch from each switch pack operates the correct feature as assigned.

**Replacing switch pack - Existing truck switch packs are at kernel 24 or higher. Replacement part is at kernel 17 or 23 or lower.**

**NOTE – All switch packs need to be at the same kernel in order to function properly. This section will provide instructions on how to update the switch packs in the vehicle before installing the replacement part.**

**NOTE – You do not need the serial number of the faulty switch pack that is being replaced.**

1. Record the serial numbers of the switch packs in the vehicle, as well as the serial number for the new switch pack that will be installed, and their location.

- Record the location (or source address) with the serial number together. Example: #1 - S/N M20000000181011039, #2 - S/N M20000000181011040, #3 - S/N M2000000018101103941

To complete the upgrade and installation you will need to know the location and serial number to manually set the source address using DLB

The replacement switch pack will only display the last three digits of the serial number.

2. Key OFF.
3. Unplug switch pack 1.

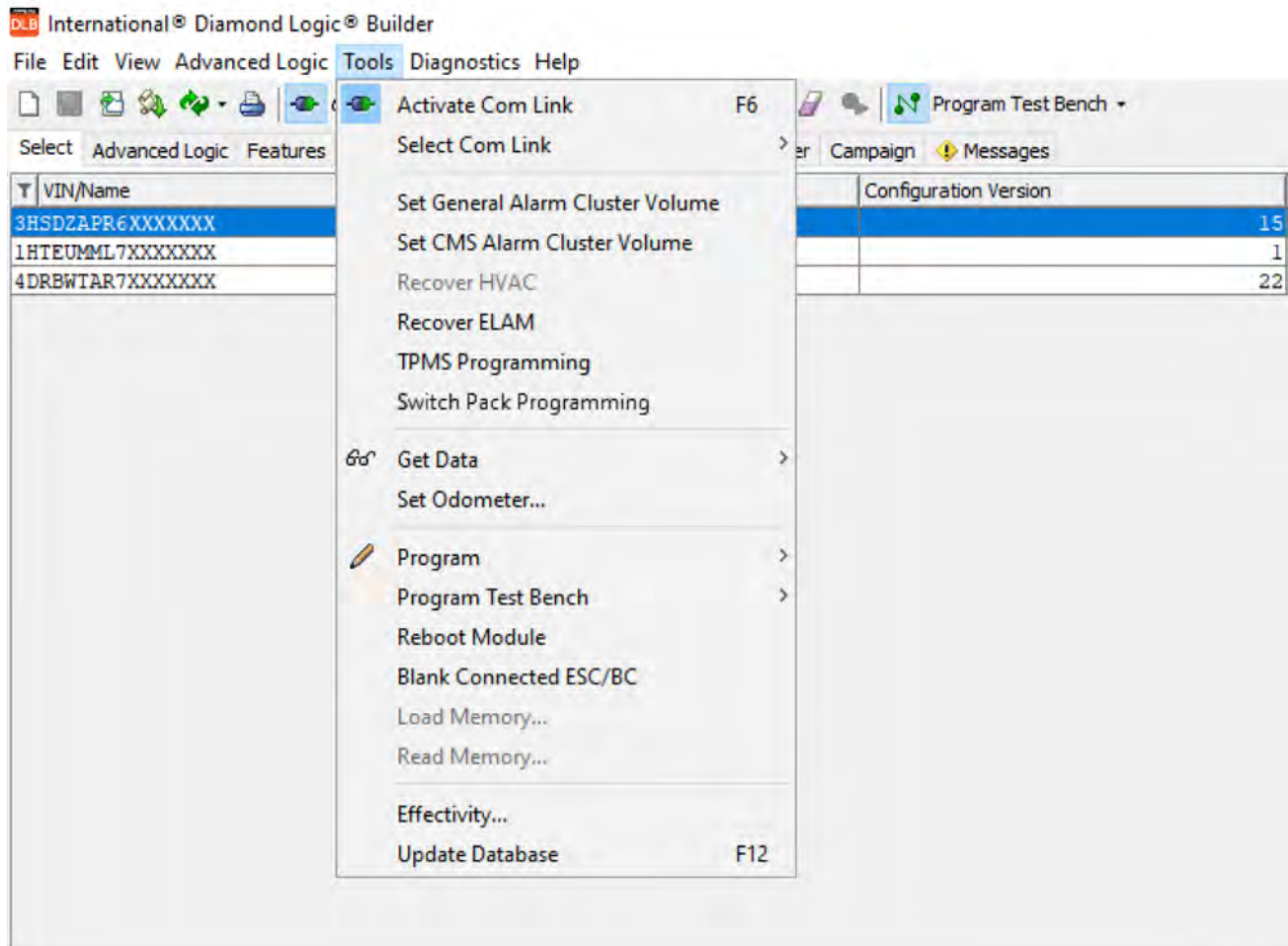


0000470637

1. Switch pack pigtail plugged into the data link going back to the IP harness
2. Power ground and data link wiring coming in from the IP harness

**Figure 166 Single Switch Pack Plugged In**

4. Plug the replacement switch pack into the number one location.
5. Unplug the switch pack pigtail of the last switch pack in the chain from the IP harness.
6. Plug the pigtail of the switch pack 1 into the connector going back to the IP harness. The replacement switch pack, in the number one location is now the only switch pack plugged in. The in and out harness should be plugged into the data link backbone.
7. Key ON.



0000470630

Figure 167 Switch Pack Programming

**NOTE** – The BCM may need to be updated before you can update the switch pack software. If a BCM update is required, DLB will detect this and prompt you to exit switch pack programming and update the BCM first. You will need to return to switch pack programming once the BCM has been updated. If a BCM update is not required, DLB will continue with switch pack programming.

**NOTE** – Items and functions displayed in the tools menu will be based on user access level.

8. Navigate to the tools menu and select SWITCH PACK PROGRAMMING.



PROGRAMMING A VEHICLE

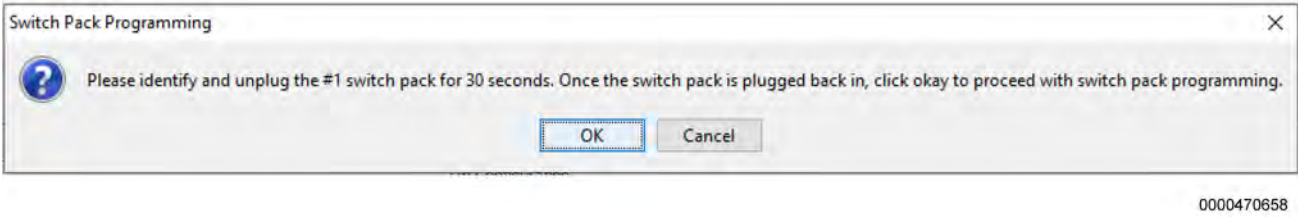


Figure 168 Unplugging Number One Switch Pack

- 9. Unplug switch pack 1. This will force the switch packs to perform a source address claim.
- 10. Select OK.

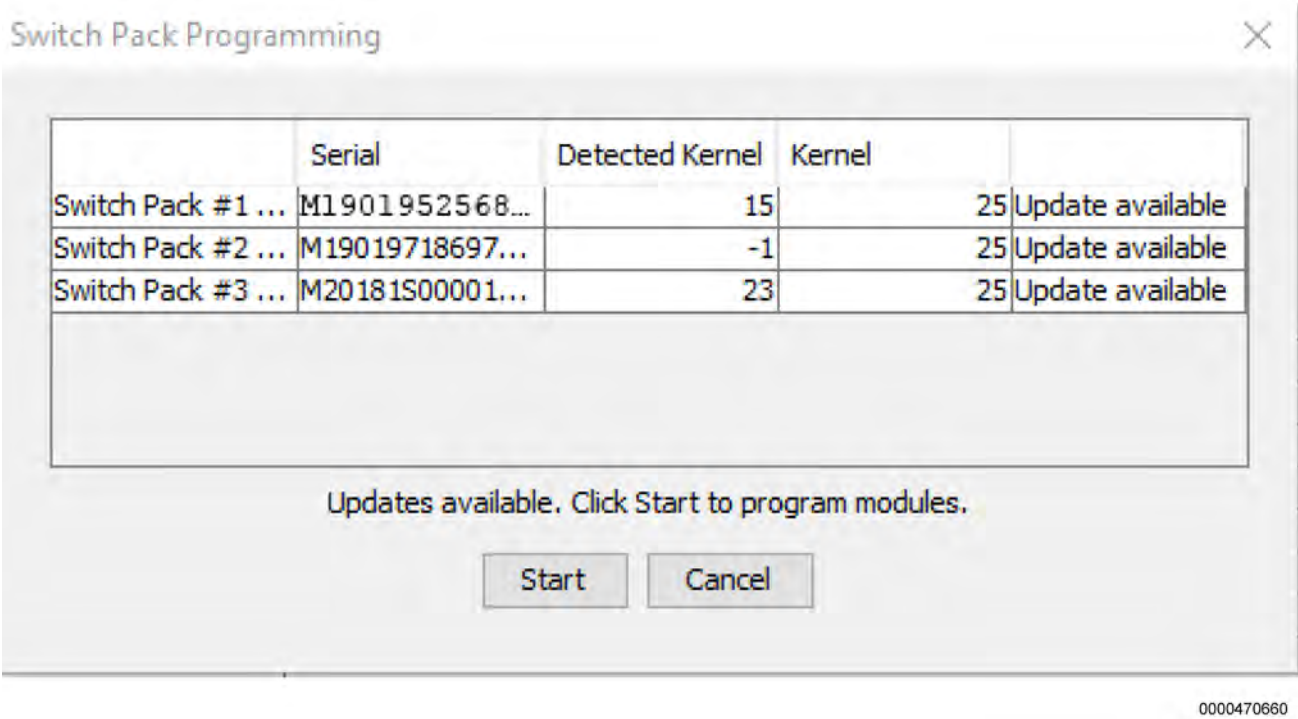
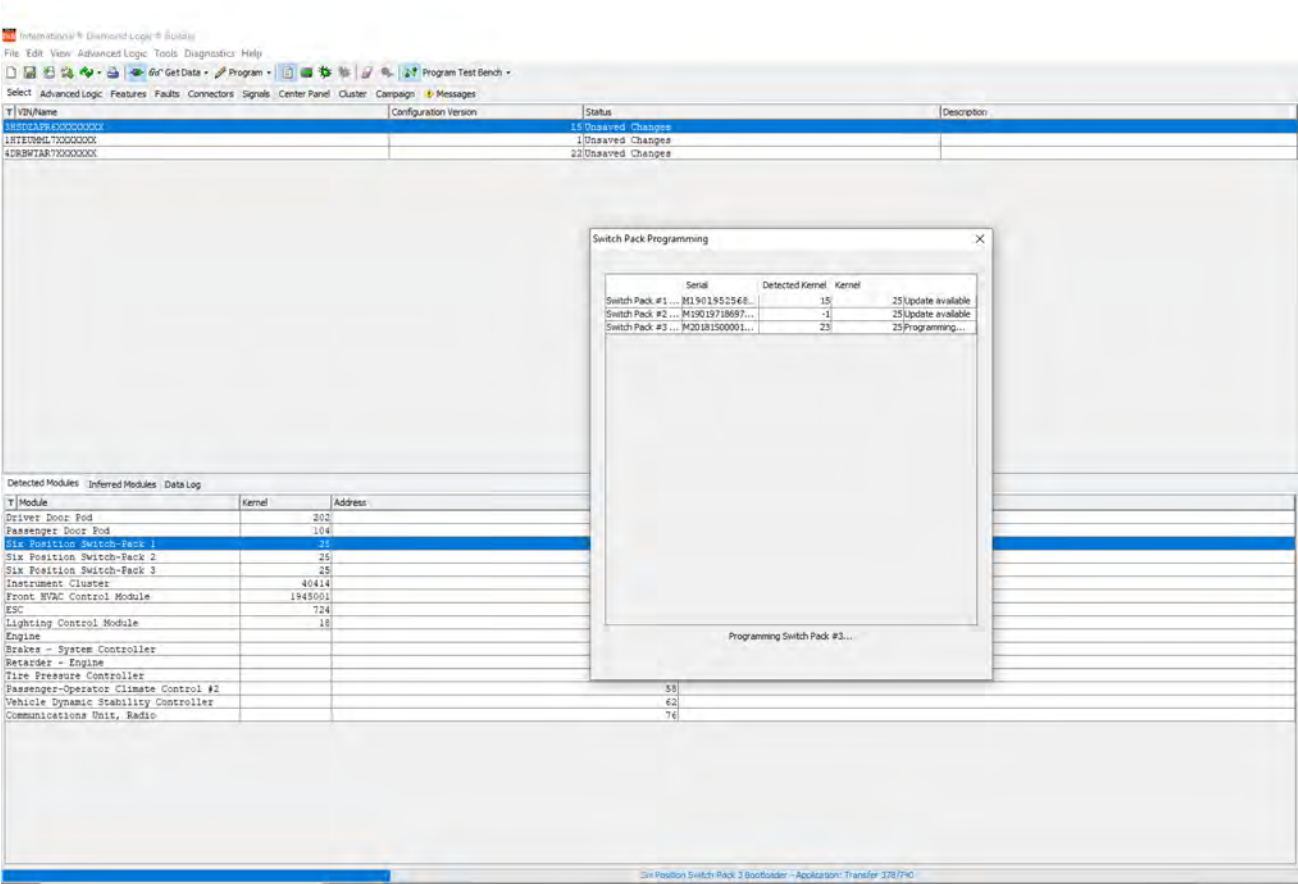


Figure 169 Update Available

- 11. Select START to initiate programming.





0000470655

Figure 170 Status Bar

The status bar indicates programming progress while the switch pack programs. The switch pack will take approximately 5 1/2 minutes to complete programming.

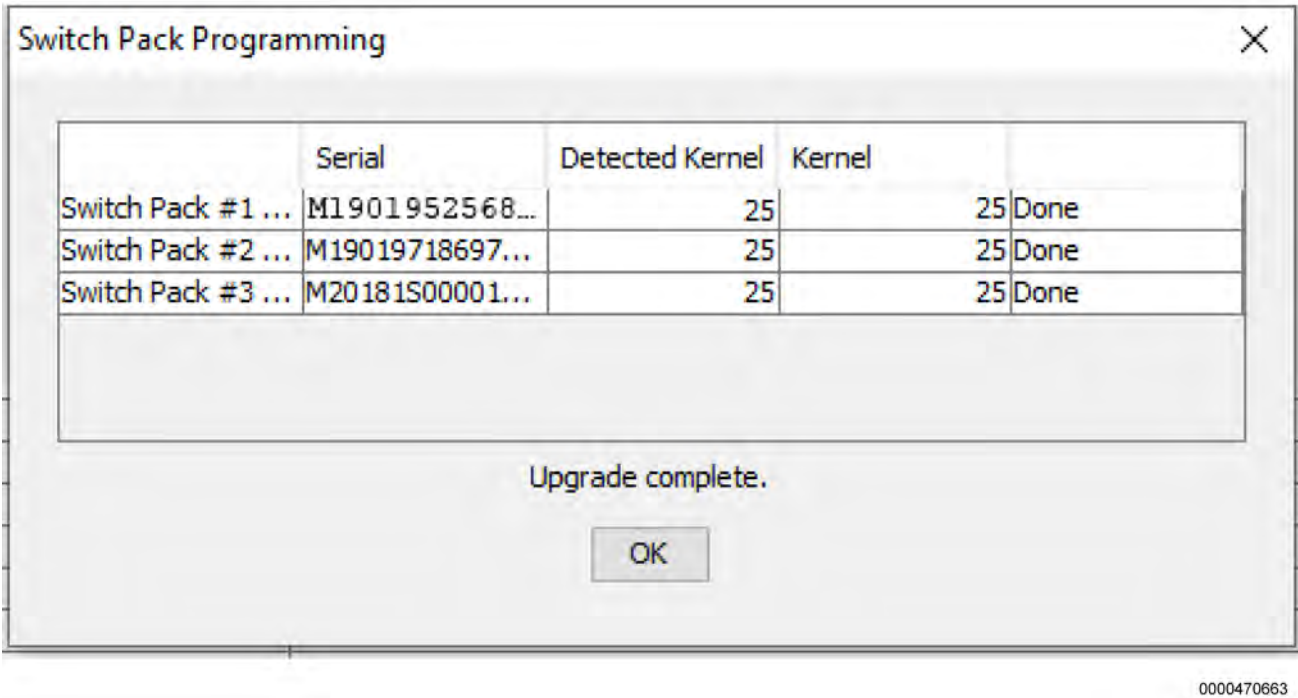


Figure 171 Upgrade Complete Notification

After the update is complete, you will be notified.

**NOTE – Switch packs may be flashing red, and the replacement part may be nonresponsive. This is normal until you manually set the source address.**

- 12. Key ON.
- 13. Navigate back to the Tools menu and select SWITCH PACK PROGRAMMING.

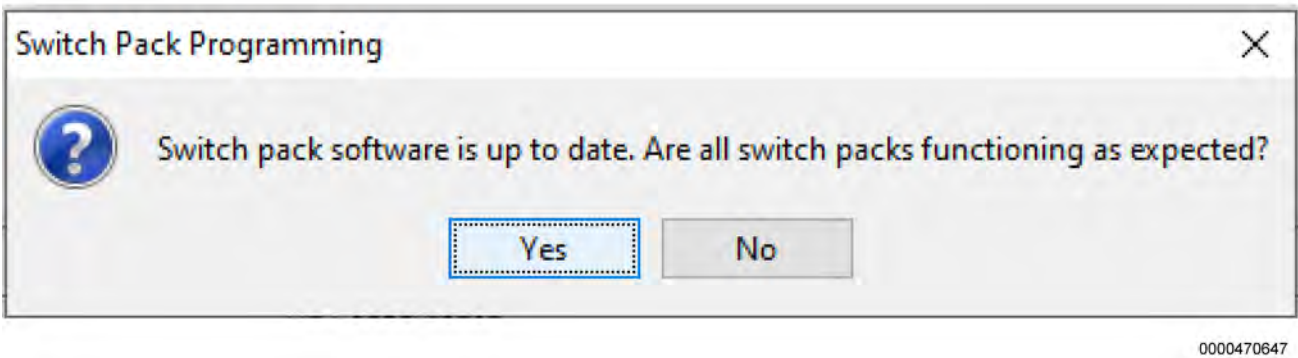
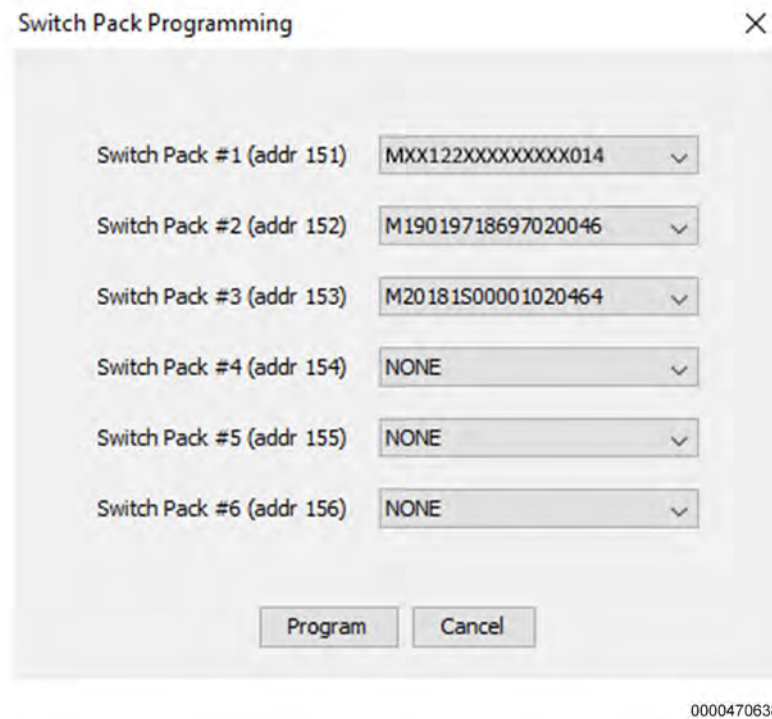


Figure 172 Setting Source Addresses Manually

- 14. Select NO. This will allow you to manually set the source addresses.



A screenshot of a software dialog box titled "Switch Pack Programming" with a close button (X) in the top right corner. The dialog contains six rows, each representing a switch pack. Each row has a label on the left and a dropdown menu on the right. The labels are "Switch Pack #1 (addr 151)", "Switch Pack #2 (addr 152)", "Switch Pack #3 (addr 153)", "Switch Pack #4 (addr 154)", "Switch Pack #5 (addr 155)", and "Switch Pack #6 (addr 156)". The dropdown menus show the following values: "MXX122XXXXXXXXXX014", "M19019718697020046", "M20181500001020464", "NONE", "NONE", and "NONE". At the bottom of the dialog are two buttons: "Program" and "Cancel".

Switch Pack	Address	Value
Switch Pack #1	151	MXX122XXXXXXXXXX014
Switch Pack #2	152	M19019718697020046
Switch Pack #3	153	M20181500001020464
Switch Pack #4	154	NONE
Switch Pack #5	155	NONE
Switch Pack #6	156	NONE

0000470638

**Figure 173 Switch Pack Programming**

Switch pack 1 was replaced. Only a partial serial number is displayed.

15. Set the switch pack source addresses based on their serial number and location in vehicle.
16. Select PROGRAM.

PROGRAMMING A VEHICLE

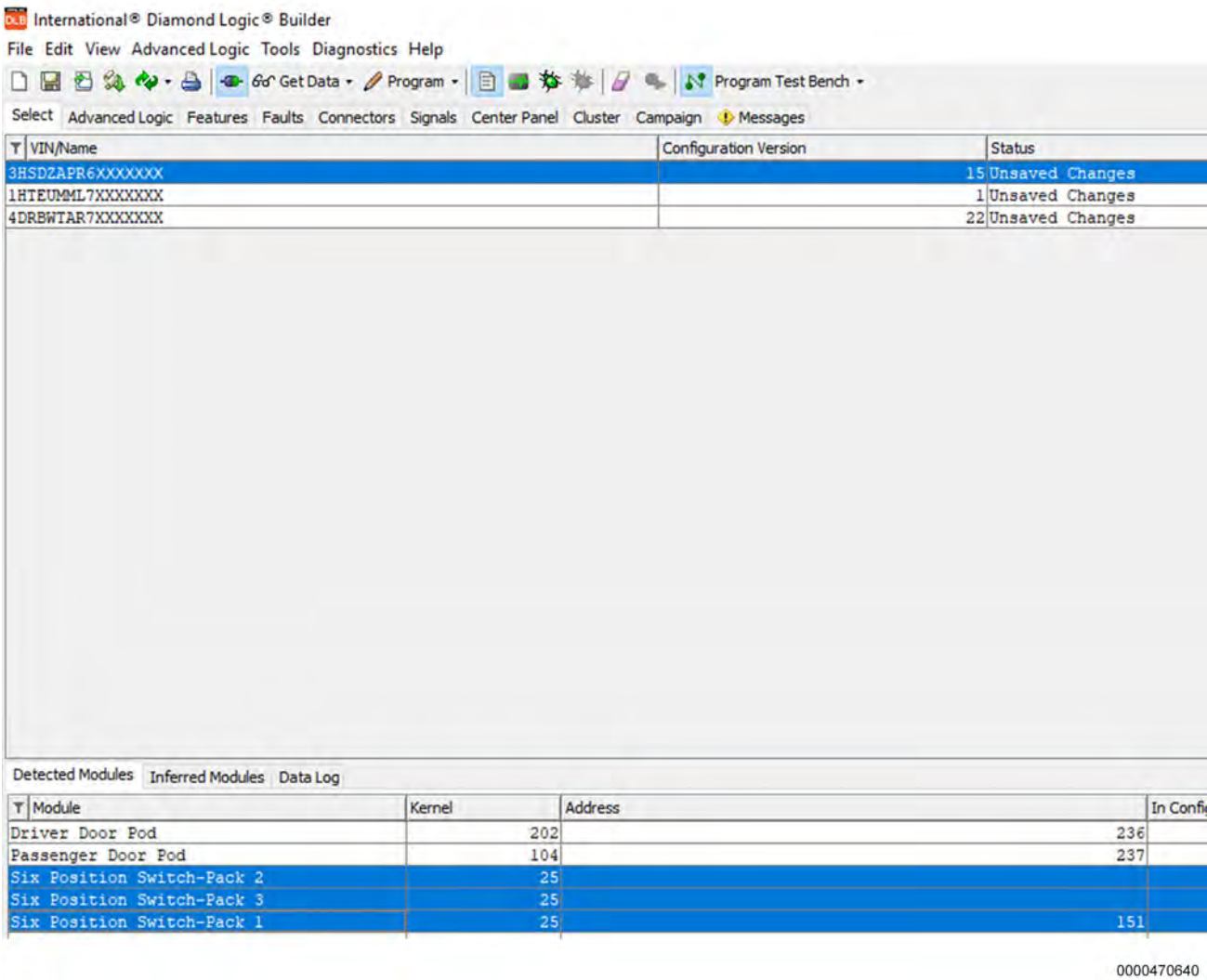


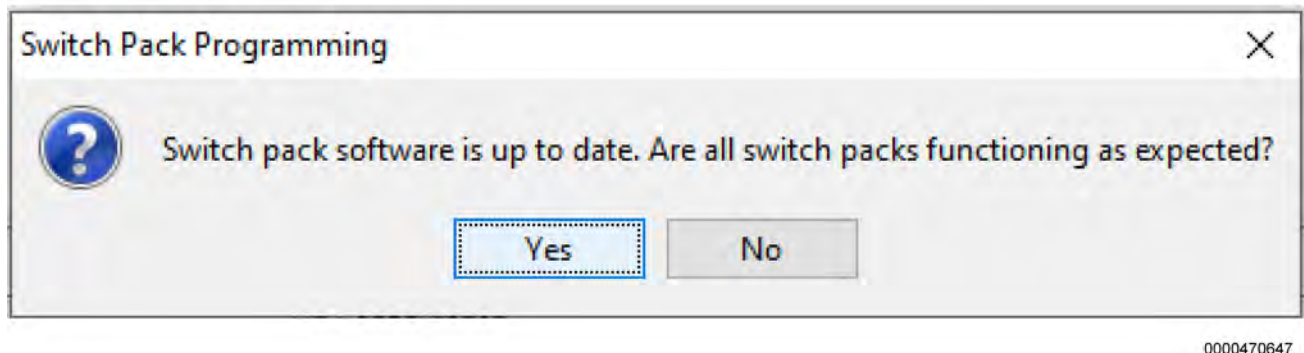
Figure 174 Programming Complete

17. Source address programming is complete. Verify all switch packs are showing they have been updated to the latest kernel.
18. Verify that one switch from each switch pack operates the correct feature as assigned.

Replacing switch pack - Existing truck switch packs are at kernel 24 or higher - Replacement switch pack is at kernel 24 or higher.

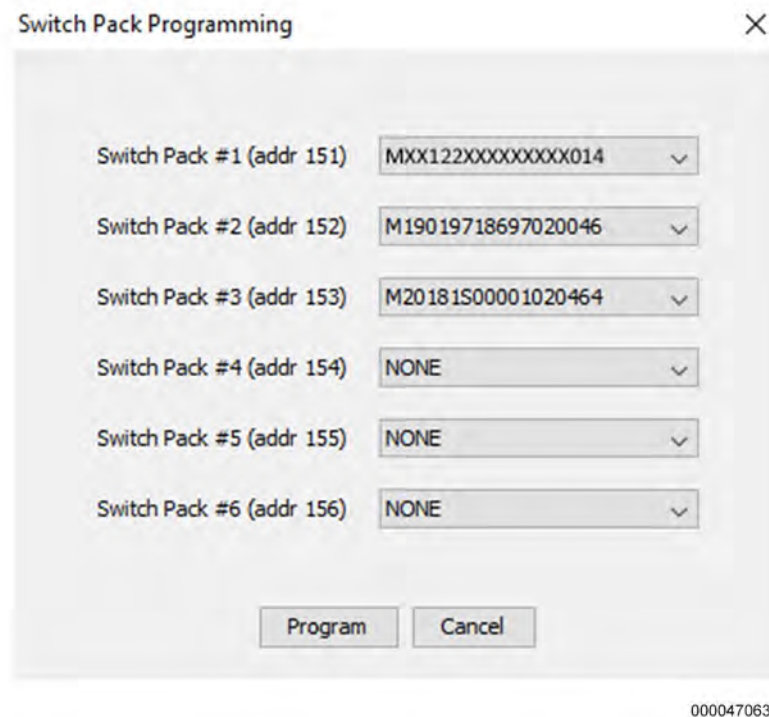
**NOTE –** Switch packs may be flashing red, and the replacement switch pack may be non-responsive. This is normal until you manually set the source address.

1. Key ON.
2. Navigate back to the Tools menu and select SWITCH PACK PROGRAMMING.



**Figure 175 Setting Source Addresses Manually**

3. Select NO. This will allow you to manually set the source addresses.

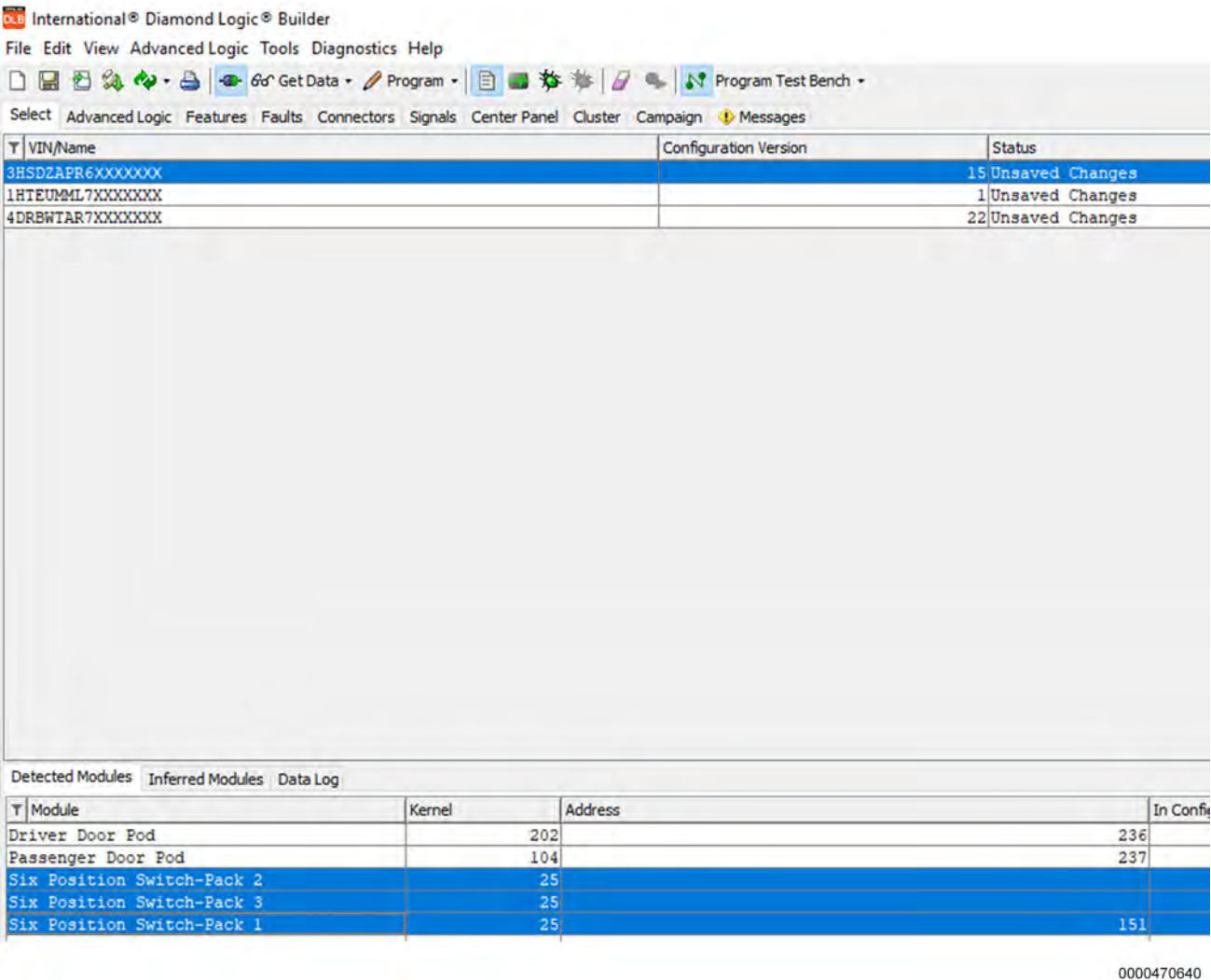


**Figure 176 Switch Pack Programming**

## PROGRAMMING A VEHICLE

Switch pack 1 was replaced. Only a partial serial number is displayed.

4. Set the switch pack source addresses based on their serial number and location in vehicle.
5. Select PROGRAM.



**Figure 177 Programming Complete**

Source address programming is complete.

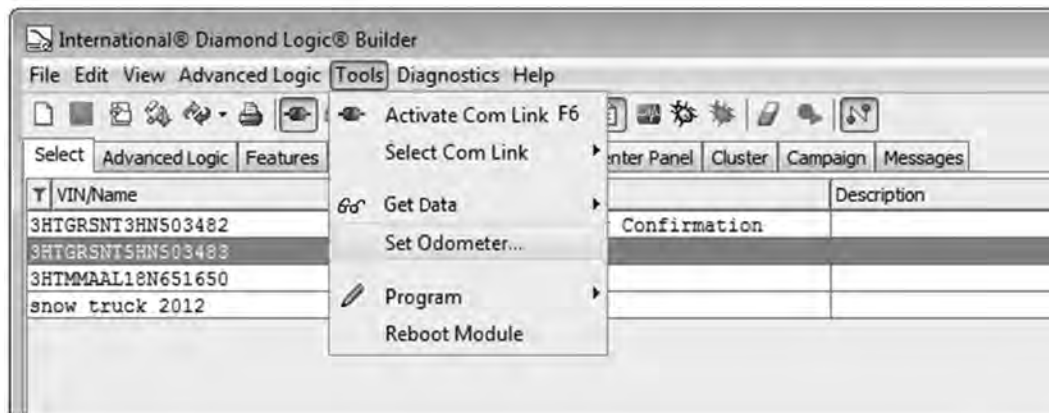
6. Verify that one switch from each switch pack operates the correct feature as assigned.

## CLUSTER ODOMETER PROGRAMMING

The Diamond Logic® Builder software can be used to set the Odometer Value in the LCD display.

1. In the menu bar, select Tools, then Set Odometer.

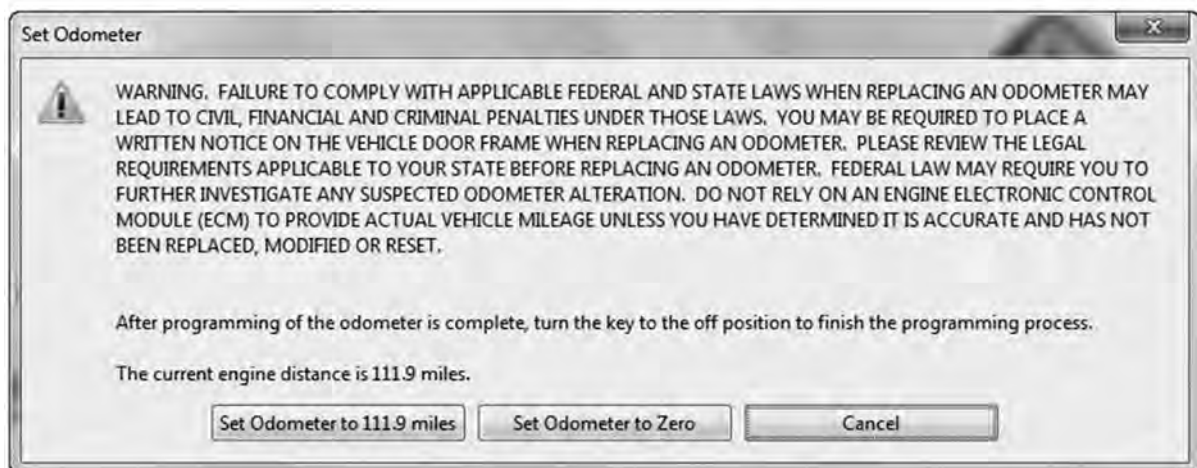




0000410579

Figure 178 Tools Menu

The Set Odometer window appears.



0000410580

Figure 179 Set Odometer Window

2. Read and follow the instructions in the Set Odometer window. Then, select the appropriate option for setting the odometer.

## TIRE PRESSURE MONITORING SYSTEM (TPMS) PROGRAMMING



### WARNING

To prevent personal injury and / or death, or damage to property, before swapping wheels to different locations, use DLB to identify the current configuration. Make note of the pressure sensor serial numbers assigned to each location. Use DLB to program the sensors to the correct locations, if wheels are moved to different locations.



### WARNING

To prevent personal injury and / or death, or damage to property, always follow these instructions when mounting tires on wheels. Only personnel who have had proper training and experience should mount or remove tires from rims or wheels. Use only heavy-duty rims or approved rims for radial tires. It may be necessary to contact your wheel and rim distributor to determine if your rims are approved for radial tires. If a tube is to be used, make sure that special radial tire tubes are used because of the increased flexing of the sidewalls on radial tires. Never use antifreeze, silicones, or petroleum-based lubricants when mounting radial tires. Only an approved lubricant should be used as an aid for mounting tires. Always inflate tires in a safety cage.



### WARNING

To prevent personal injury and / or death, or damage to property, do not mix stud-piloted wheels or fasteners with hub-piloted wheels or fasteners. Mixing wheel types may cause premature wheel failure. Do not change from steel wheels or a steel inner and aluminum outer wheel combination, to aluminum wheels, without changing the mounting hardware, since the thicker aluminum wheels require longer studs. In some cases, with flange nut mounting systems, changing the hub and stud assembly may be required. Improperly mixing components could cause wheel or fastener failures. Do not mix foreign (not made in North America) wheel mounting parts with domestic (made in North America) parts. Many foreign wheel components look similar to, but are not exactly the same as, domestic made components.



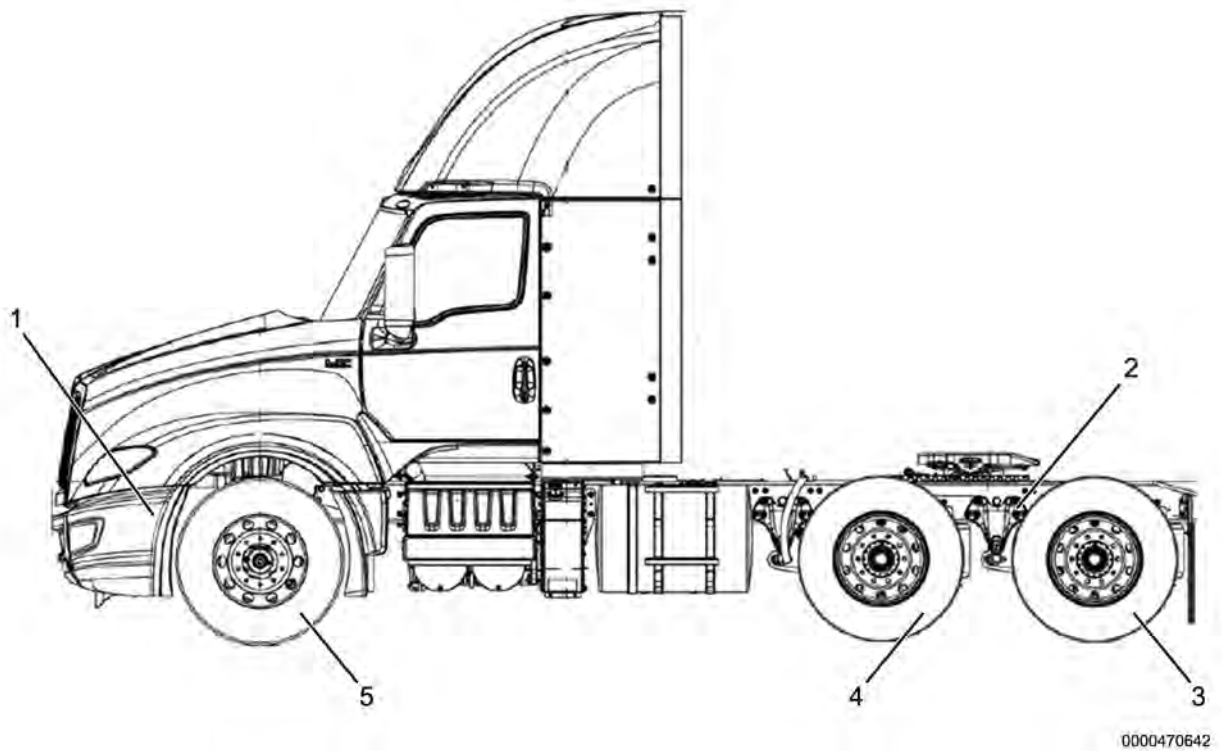
### CAUTION

To prevent damage to property or components, when mounting and dismounting a tire, take care not to damage the pressure sensor that is strapped to the inner rim. If tire work is done at another facility, please let them know that a tire pressure monitoring system is installed on the vehicle, before they remove a tire from a wheel.

## System Overview

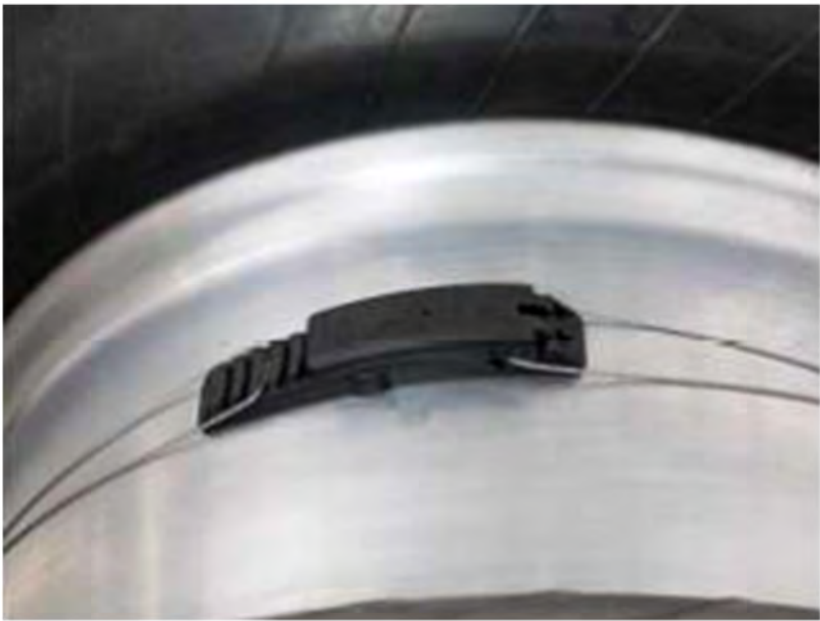
Tire Pressure Monitoring System (TPMS) provides warnings when the tire pressure is out of the desired range or the tire temperature is too high. Feature codes are 16VLS, 16VUY, 16VVA, and 16VUZ. The system monitors the temperature compensated and the tire pressure of each wheel. Tire pressure information is displayed in the LCD for 4 x 2, 6 x 4, and Super Single axle configurations. The system does not include monitoring for lift axles, spare wheels, or trailer wheels. All system programming is accomplished using the Tire Pressure Monitoring System (TPMS) Programming selection, found in the Tool Menu in the DLB software.





- |                                   |                 |
|-----------------------------------|-----------------|
| 1. Front receiver module          | 4. Wheel sensor |
| 2. Rear secondary receiver module | 5. Wheel sensor |
| 3. Wheel sensor                   |                 |

**Figure 180 TPMS Location Overview**



0000470645

Figure 181 Installed Wheel Sensor

The system uses two receiver modules. The front receiver is hard wired to the truck data link. The second receiver communicates via wireless, using a 433 MHZ signal, to the front receiver. A wheel sensor is installed on each wheel rim.

CONNECTING TPMS MODULE WITH DLB

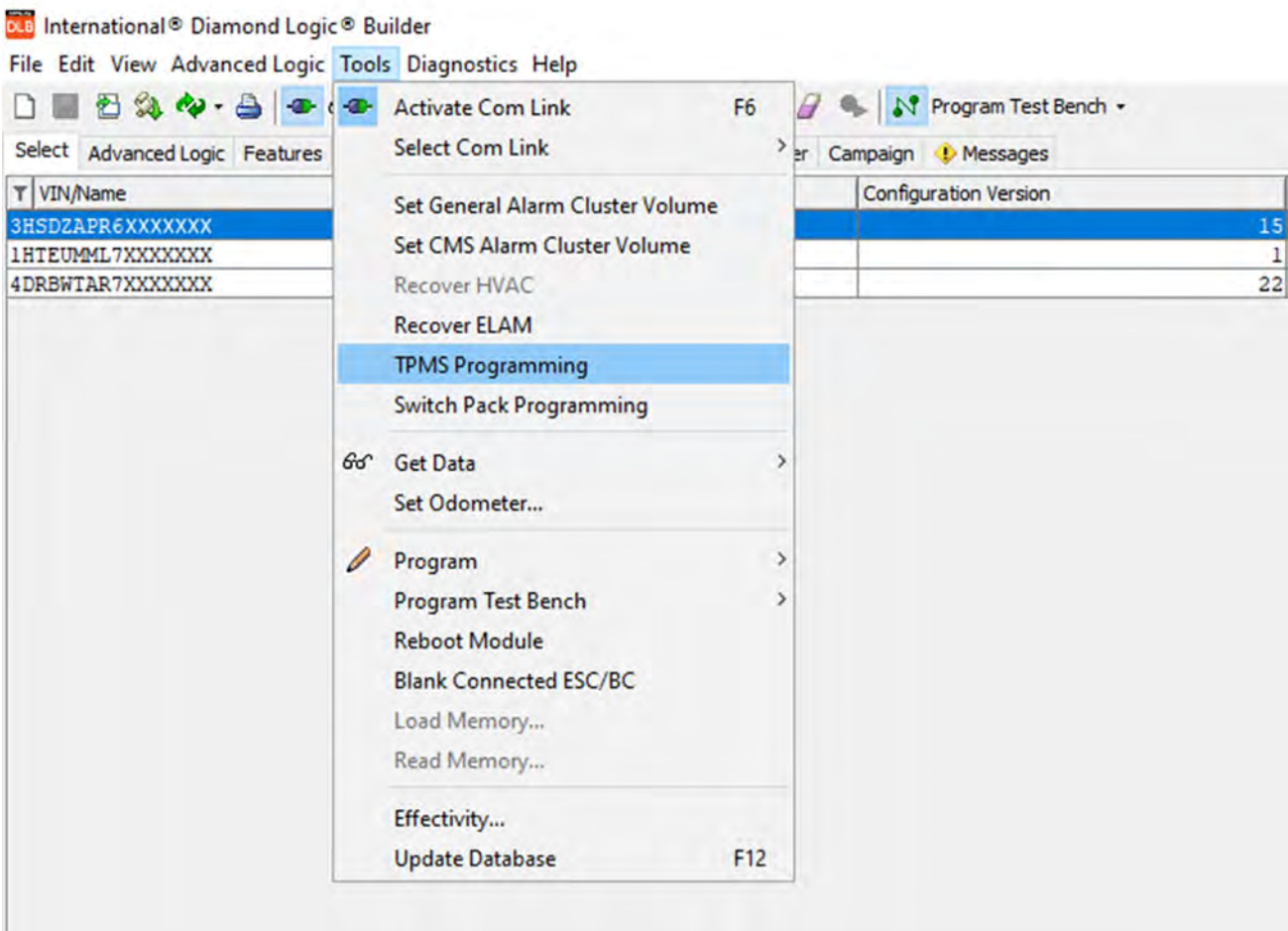
Detected Modules					Inferred Modules	Data Log	
T	Module	Address	Detected				Data Link
	Vehicle Dynamic Stability Controller	62	✓				Drivetrain J1939
	Tire Pressure Controller	51	✓				Drivetrain J1939
	Switch Pack 3	153	✓				Drivetrain J1939
	Switch Pack 2	152	✓				Drivetrain J1939
	Six Position Switch-Pack 3						
	Six Position Switch-Pack 2						
	Six Position Switch-Pack 1	151	✓				Drivetrain J1939
	Retarder - Engine	15	✓				Drivetrain J1939
	Passenger-Operator Climate Control #2	58	✓				Drivetrain J1939

0000470643

Figure 182 TPMS Module Display in DLB

Use DLB to connect to the vehicle, with the key ON. The TPMS will only power up when the key is ON. The TPMS module should be detected as shown above.

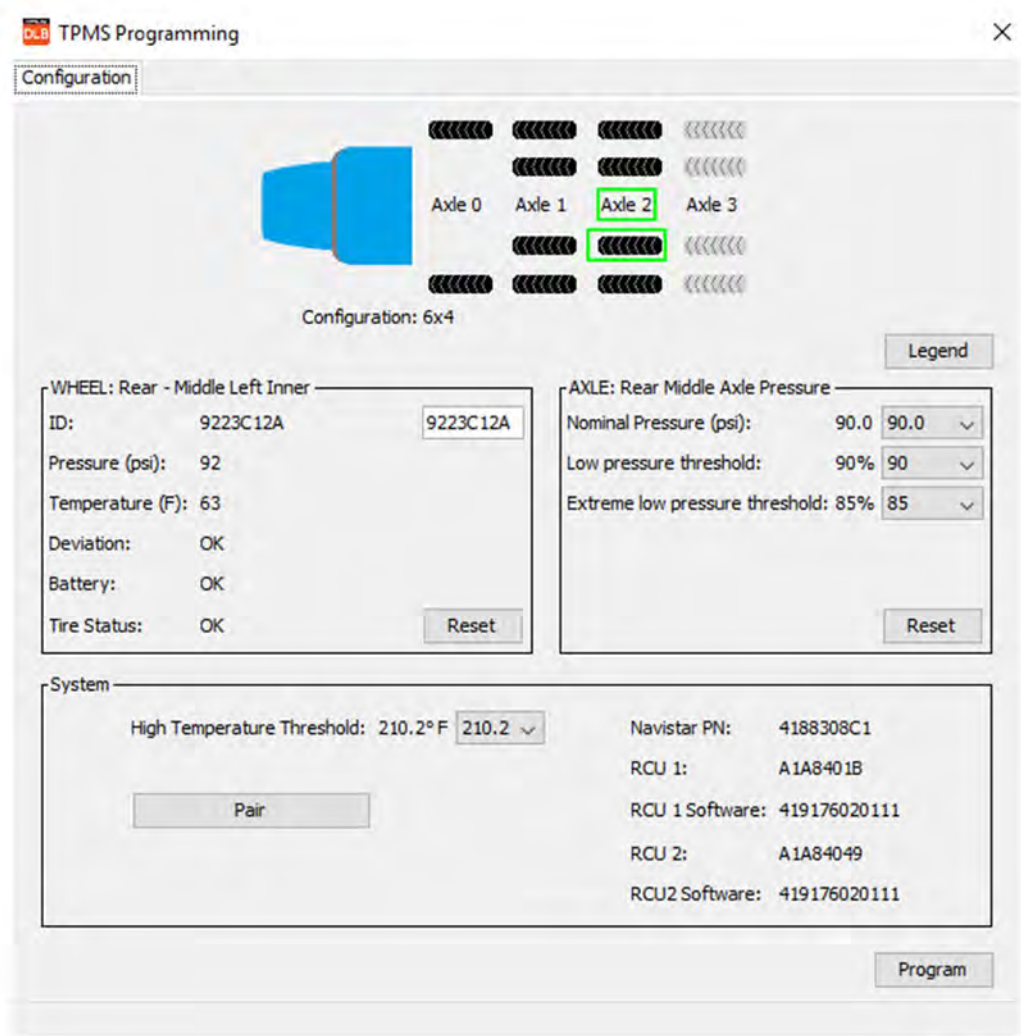
TPMS PROGRAMMING AND MONITORING



0000470641

Figure 183 Tools Menu

When the TPMS is detected and the Tools tab is selected, the TPMS programming option will be displayed as shown above.



0000470644

Figure 184 TPMS Sensor Display

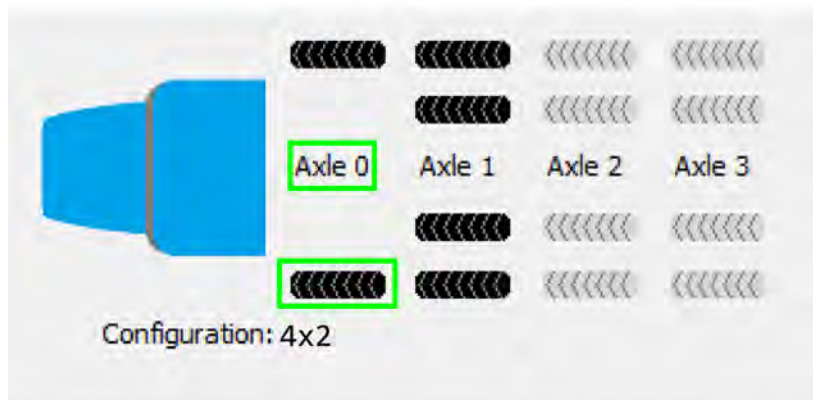
**NOTE – It may take up to 5 minutes for all sensors to be read.**

The graphic shown above shows what will be displayed after clicking on TPMS Programming. This screen provides the interface to monitor the system, adjust and program parameter changes, and pair new receivers.

The Program button will program any changes that are made.

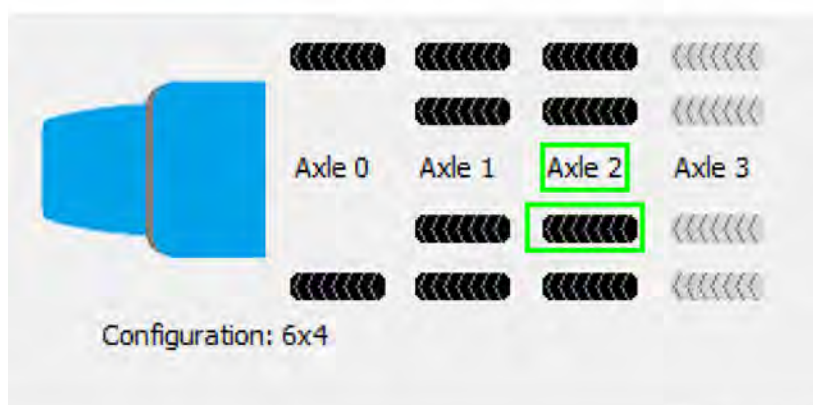
The Reset buttons will revert any changes that are made before programming any changes.

The Pair button is used to pair the rear receiver to the front receiver.



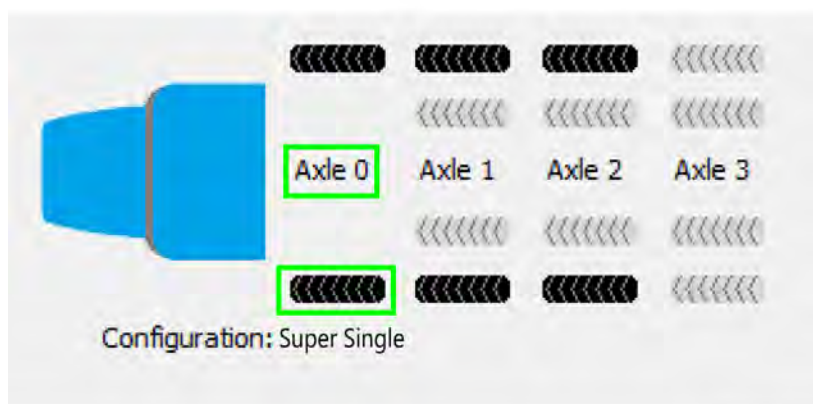
0000470648

Figure 185 TPMS Axle Configuration 4x2



0000470651

Figure 186 TPMS Axle Configuration 4x6



0000470653

Figure 187 TPMS Axle Configuration 4x6

# PROGRAMMING A VEHICLE

The vehicle configuration is determined by the number of axles and wheels that are programmed as shown in the examples above.

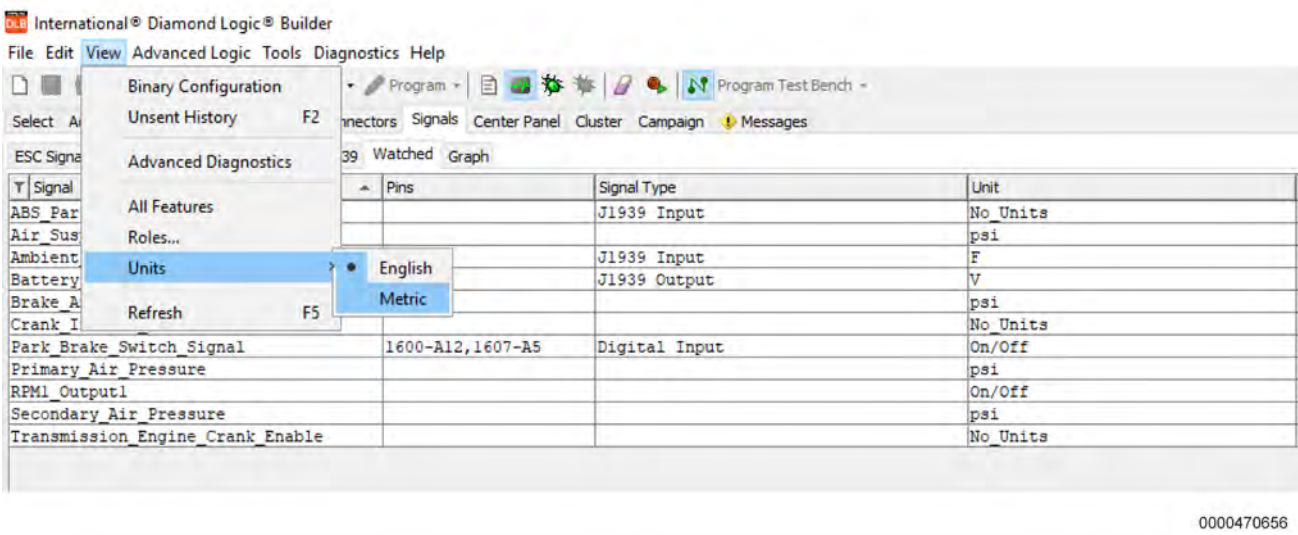
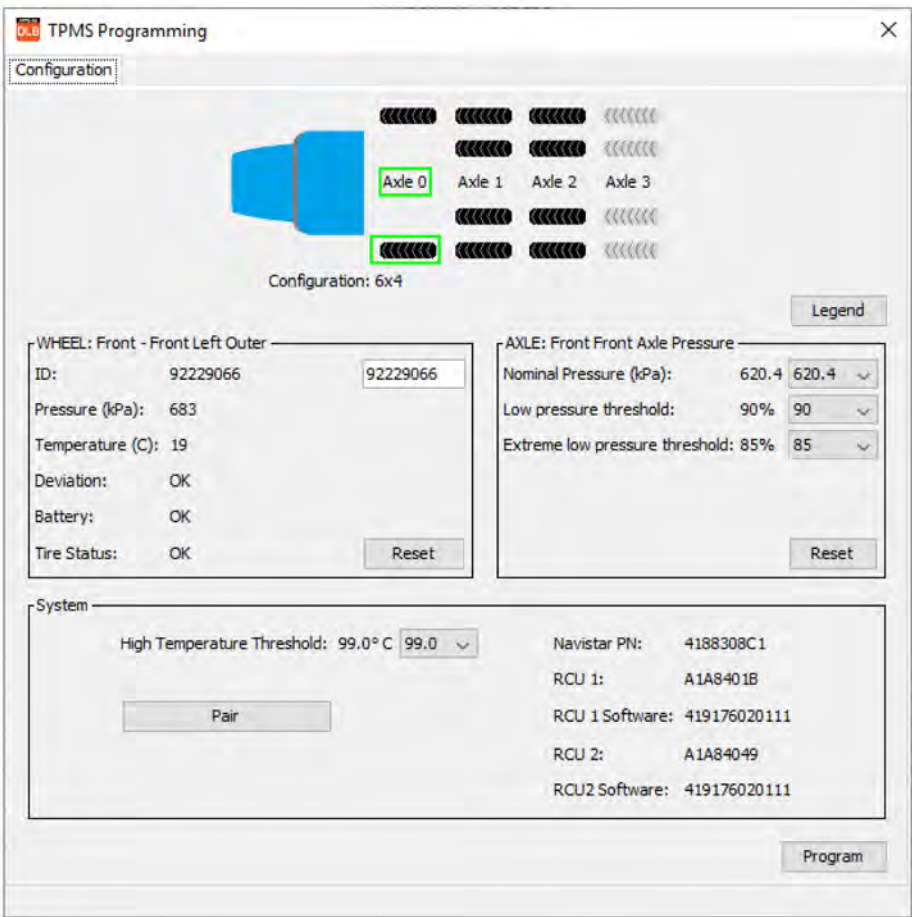


Figure 188 Measurement System

Selecting **Units** from the View menu in DLB changes the units shown in TPMS programming..





0000470657

Figure 189 Metric Measurement Display

The graphic above is an example of how the Metric selection appears.



Figure 190 TPMS Wheel Sensor and Axle Configuration

The graphic above shows the axle configuration and status of each wheel sensor that is installed.

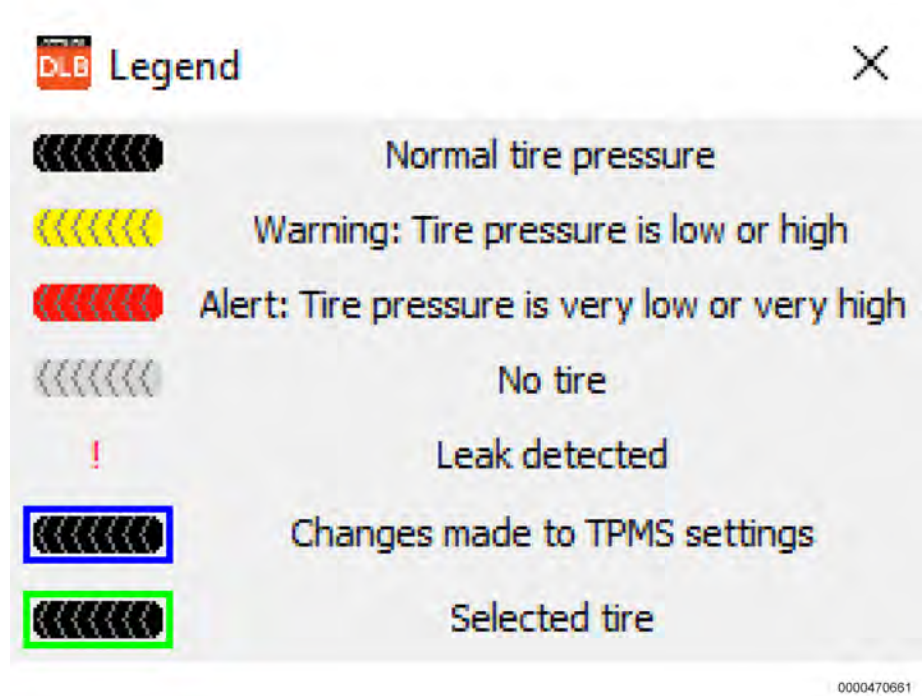


Figure 191 Legend

Clicking on **Legend** displays an explanation of the different states of the tires.

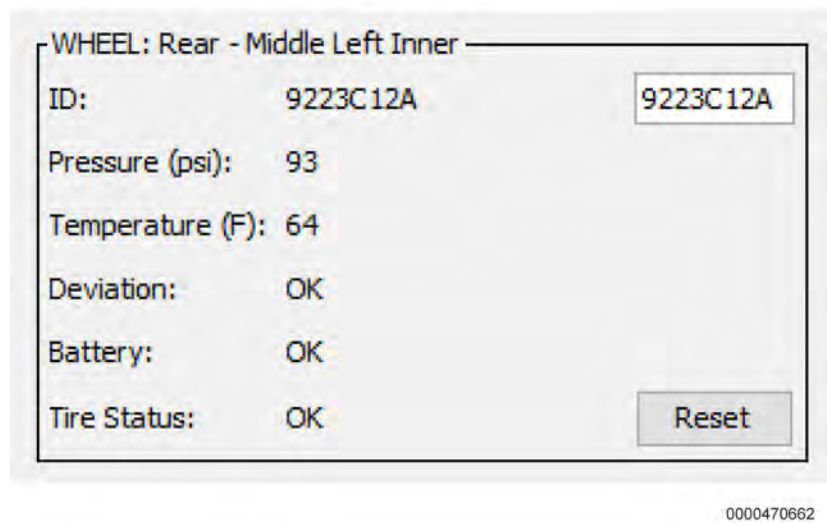


Figure 192 Selected Tire Status

Click on the desired wheel to make changes to the Sensor ID at that location or the axle associated with that wheel. The graphic above shows the status of the selected wheel.

Changing the eight-character wheel sensor ID will change the sensor that is associated with the selected wheel.





**Figure 193 Wheel Sensor ID**

The wheel sensor ID is printed on a label that is attached to each sensor.

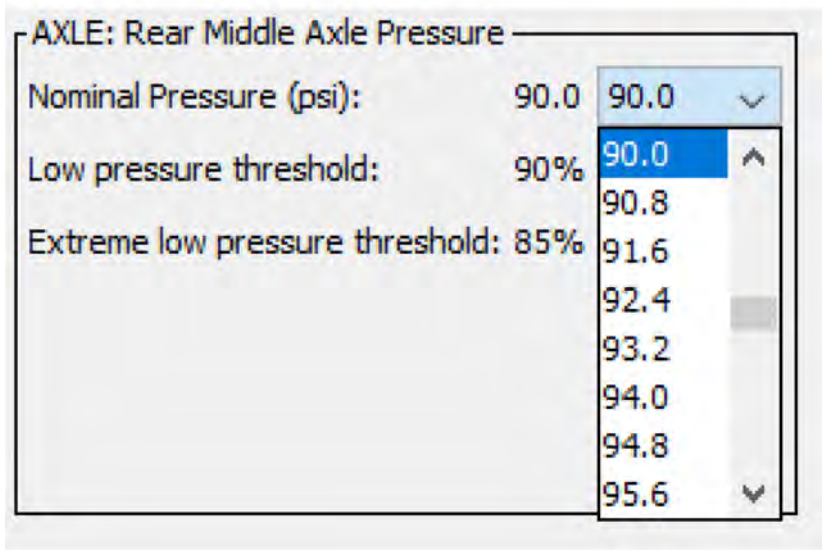
Setting the eight-character wheel sensor ID to 00000000 will remove any sensor correlation to that wheel. This can be used to remove the sensors, if the configuration is changed due to removal of an axle or setting the tire configuration for super singles.

Clicking on the Program button will program any changes that are made.

0000470615

**Figure 194 Tire Pressure Values Per Axle**

The graphic above shows the programmed tire pressure that is desired, on the selected axle. It also shows the desired pressure percentages for the low pressure and extreme low pressure conditions.



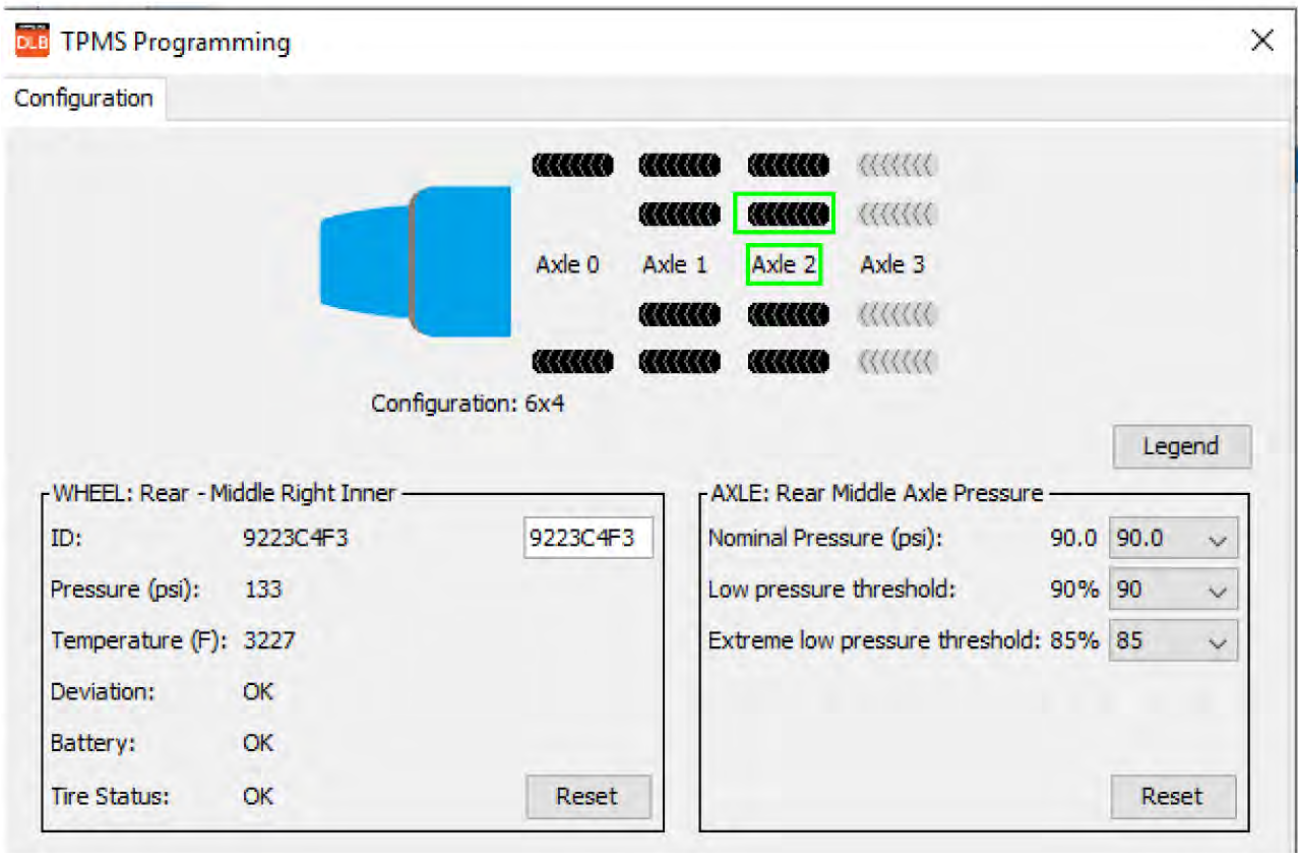
0000470614

**Figure 195 Tire Pressure Desired Values**

Changing the value for one wheel, on an axle, will change the values for all wheels on the axle. The low pressure parameter is not adjustable. It is set for 125% of the Nominal Pressure. To adjust the desired values, make a change and then program. Clicking on the value will cause a drop down to appear.

Select the desired value.

The Program button will program any changes that are made.

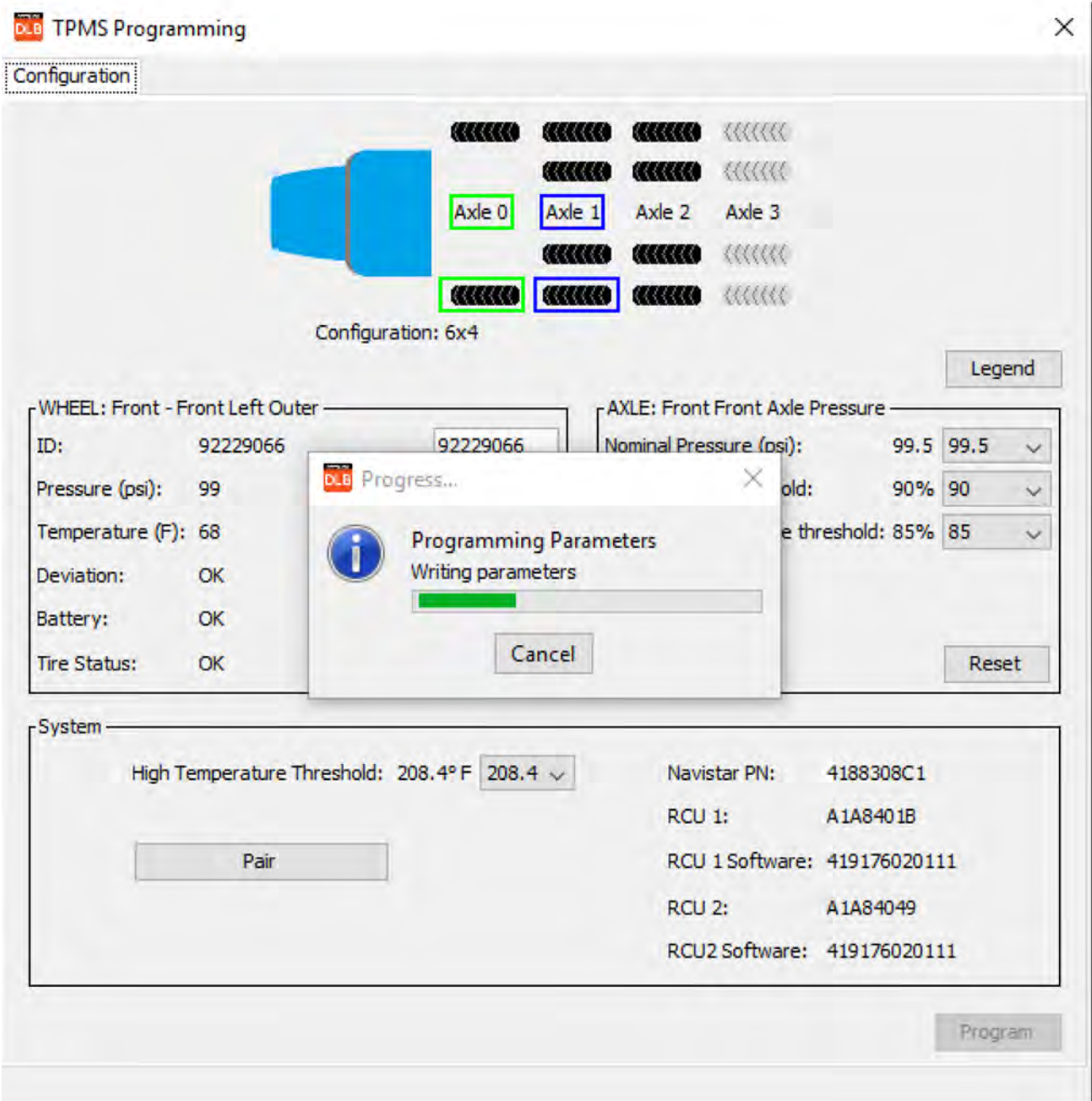


0000470622

**Figure 196 Undetected Wheel Sensor Output Values**

A tire sensor that is not being detected will display the values, as shown above.

PROGRAMMING A VEHICLE



0000470620

Figure 197 TPMS Programming

The outlined BLUE wheel indicates changes were made to the sensor ID numbers and the wheel is waiting to be programmed.

Several changes can be made prior to committing them by programming. It also shows the progress bar that is displayed during the programming process.

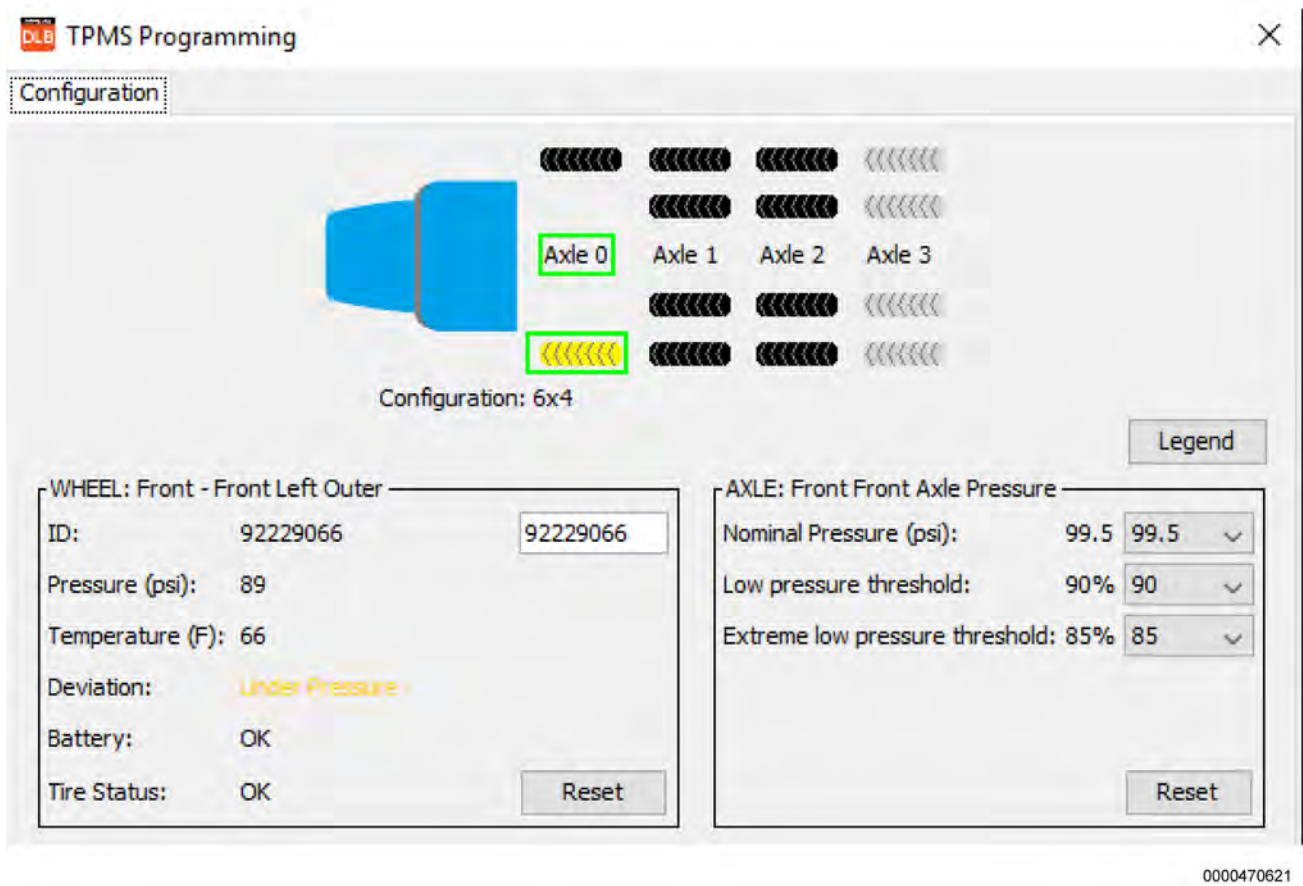


Figure 198 Under-Pressure Tire Condition

The graphic, shown above, includes the indication that a selected tire has an under-pressure condition.



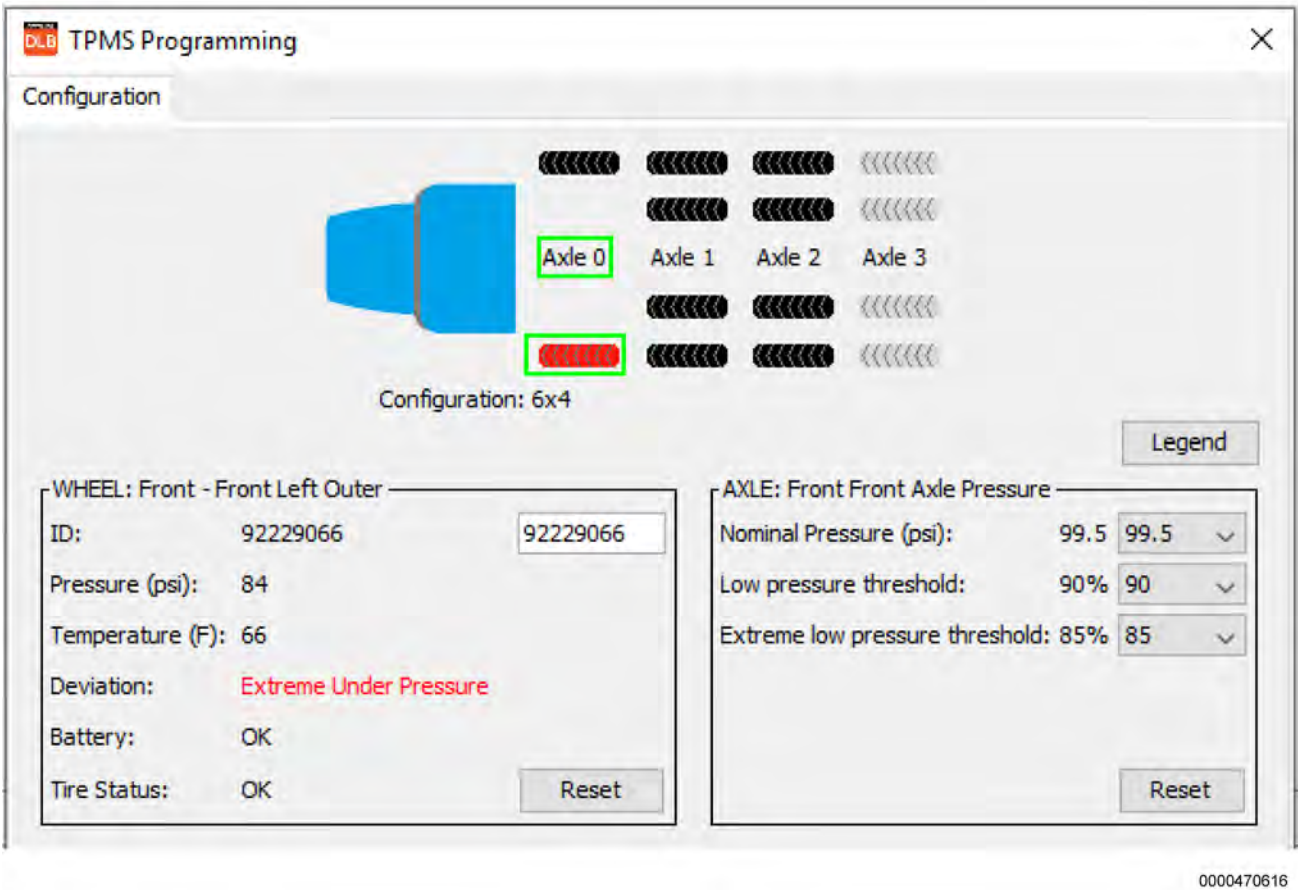


Figure 199 Extreme Under-pressure Tire Condition

The graphic above indicates that a selected tire has an extreme under-pressure condition.

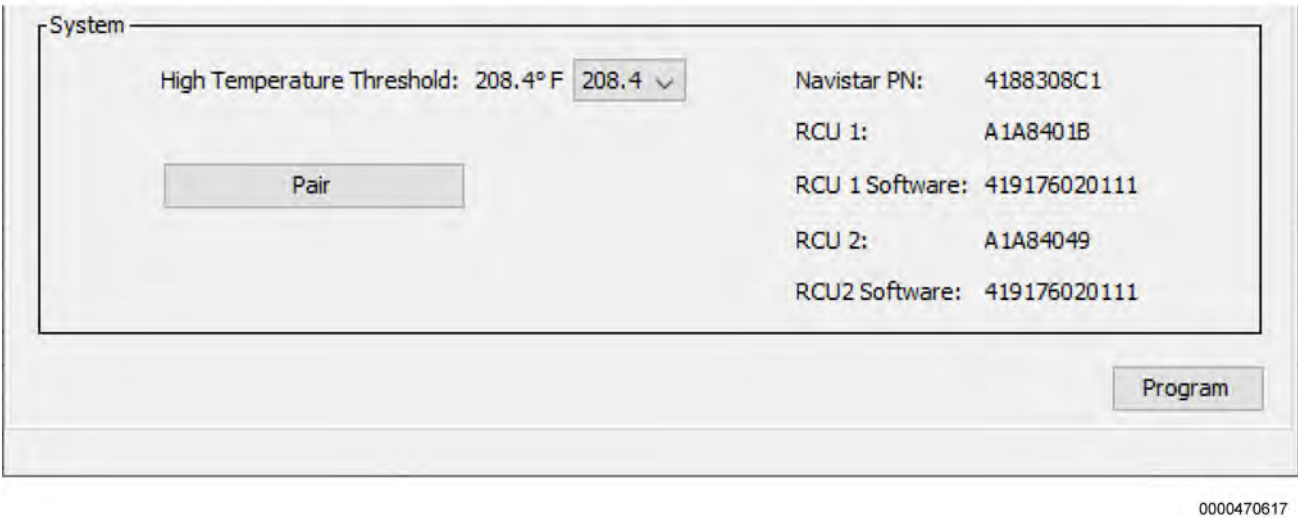


Figure 200 TPMS High Temperature Threshold and TPMS Receiver One and Two Information

The graphic above shows the setting for the High Temperature Threshold and the information for both TPMS receivers. The user will be able to adjust the desired values and pair the secondary wireless receiver.

The screenshot shows a software interface for programming a vehicle's TPMS. It features a 'System' tab, a 'High Temperature Threshold' set to 208.4°F, a 'Pair' button, and a dropdown menu with values ranging from 204.8 to 217.4. To the right, it displays Navistar PN: 4188308C1, RCU 1: A1A8401B, RCU 1 Software: 419176020111, RCU 2: A1A84049, and RCU2 Software: 419176020111. A 'Program' button is located at the bottom right.

Setting	Value
High Temperature Threshold	208.4°F
Navistar PN	4188308C1
RCU 1	A1A8401B
RCU 1 Software	419176020111
RCU 2	A1A84049
RCU2 Software	419176020111

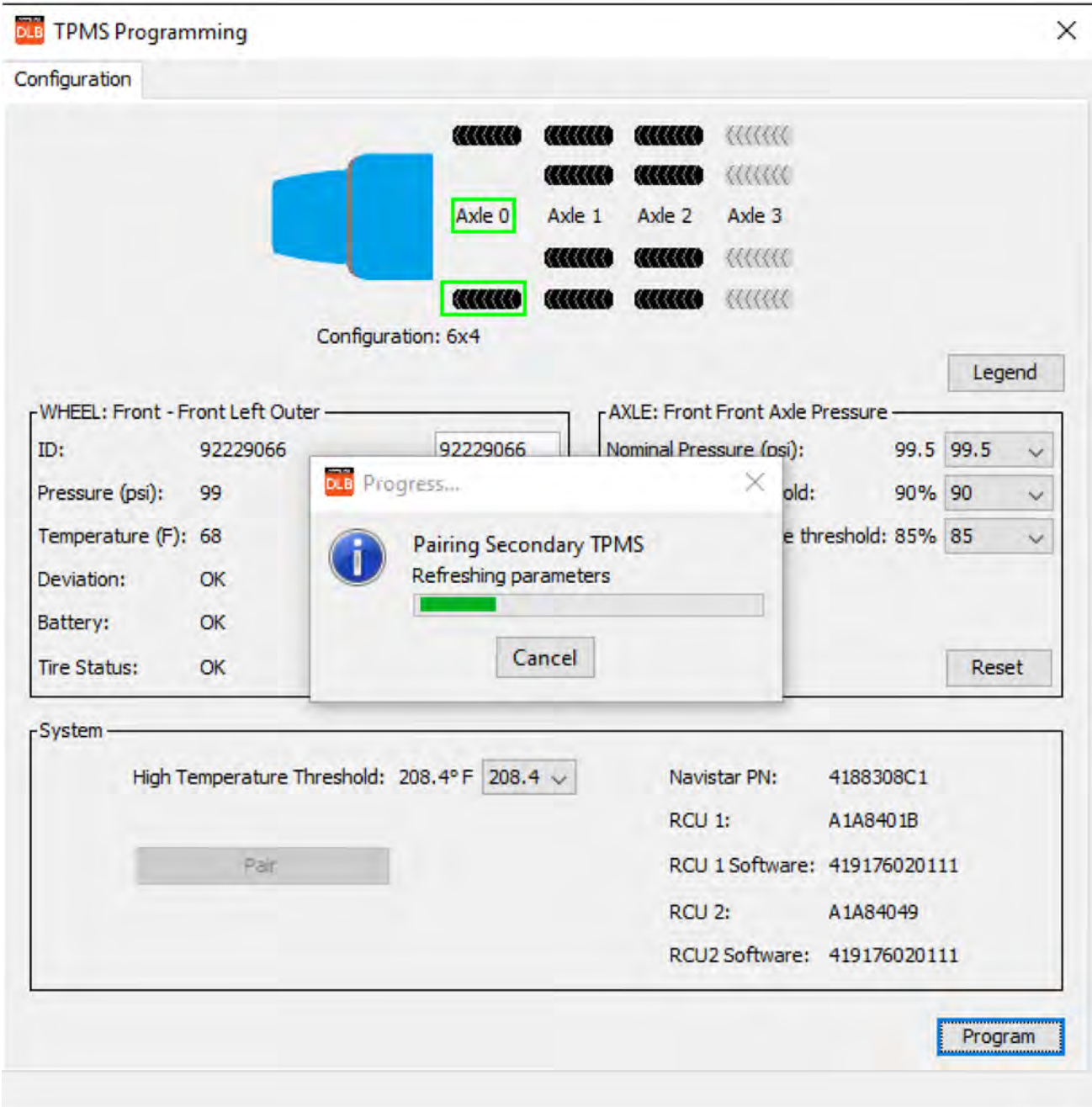
0000470618

**Figure 201 TPMS High Temperature Threshold Desired Values**

Clicking on the value will cause a dropdown to appear.

Click on the desired value, then select Program. Changing the value will set the temperature threshold for all tires, on both receivers. All trucks will have two receivers. The first one is connected to the Body Builder data link and the second one communicates, via wirelessly, to the first one. The first receiver can handle up to 3 axles. If the second receiver fails, the first one can monitor data for the first 3 axles. When the secondary, wireless, receiver is replaced, it will need to be paired. Pairing must be requested within 10 minutes of a key cycle.

Select the Pair button to start the pairing process.



0000470619

Figure 202 Pairing Process Bar

The graphic shows the progress bar that is displayed during the pairing process. When the first receiver is replaced all the values for the wheel sensors, tire pressures and temperatures will need to be reprogrammed.

Replacement of the secondary receiver does not require programming after it is paired.



TPMS Programming

Configuration

Configuration: Unknown

Legend

WHEEL: Front - Front Left Outer

ID: 00000000 00000000

Pressure (psi): ...

Temperature (F): ...

Deviation: ...

Battery: ...

Tire Status: ...

Reset

AXLE: Front Front Axle Pressure

Nominal Pressure (psi): 116.3 116.3

Low Pressure Warn Threshold: 90% 90

Low Pressure Alert Threshold: 80% 80

Reset

System

High Temperature Threshold: 185.0°F 185.0

Pair

Navistar PN: 4188308C1

RCU 1: A1A84053

RCU 1 Software: 419176020111

RCU 2: 00000000

RCU2 Software: 000000000000

0000470665

Figure 203 Sensor Programming

**NOTE – Open a case file to see if Tech Services can provide the sensor IDs that were used when the truck was built. If they cannot be provided, each tire will need to be removed to find the sensor ID.**

The graphic above shows a receiver that has been paired but does not have any wheel sensors programmed.

Replacement of the secondary receiver does not require programming after it is paired. When the first receiver is replaced, all the values for the wheel sensors, tire pressures, and temperatures will need to be reprogrammed.

If the axle or wheel configuration is modified, the changes will need to be programmed in the TPMS system.

TPMS PROGRAMMING FOR CLUSTER DISPLAY

T	Feature	Description	Installed
*0597158		BCM PROG, TPMS CLUSTER DISPLAY, 6x4	<input type="checkbox"/>
*0597159		BCM PROG, TPMS CLUSTER DISPLAY, 4x2	<input type="checkbox"/>
*0597160		BCM PROG, TPMS CLUSTER DISPLAY, 6x4 Plus Tag/Pusher Axle	<input type="checkbox"/>
*0597161		BCM PROG, TPMS CLUSTER DISPLAY, 6x4/6x2 (Super Single Tires)	<input type="checkbox"/>
*0597162		BCM PROG, TPMS CLUSTER DISPLAY, 6x4 Plus Tag/Pusher Axle (Super Single Tires)	<input type="checkbox"/>

0000470666

Figure 204 TPMS Cluster Display Feature Codes

If the tire or axle configuration is changed, the Body Control Module (BCM) feature will also need to be changed to match the new configuration.

## DIAGNOSING ELECTRICAL PROBLEMS WITH DIAMOND LOGIC® BUILDER

The Diamond Logic® Builder software can be used to aid in diagnosing and troubleshooting electrical / electronic system problems. Before proceeding with diagnosing and troubleshooting, there are several important steps:

- Verify the Problem – Operate the complete system and list all symptoms. Is the complaint due to misunderstood, customer-selected, programmed parameters?
- Gather Information – What happened and when? Under what conditions? When did the symptoms begin? What else occurred at the time?
- Check Diagnostic Trouble Codes – Do the logged codes correlate to the symptoms and probable causes? Were the codes logged repeatedly?
- Perform Preliminary Checks – Perform a thorough visual inspection. Are any wires loose or corroded? Are there damaged connectors or pins? Are all components installed and installed correctly? Check to make sure the vehicle batteries are at 75% state of charge or higher. Make sure indicator lights are not simply burned out.
- Check References – Check all relevant service information including circuit diagrams and diagnostic charts.

### ENTERING DIAGNOSTIC MODE

When diagnosing a vehicle using the Diamond Logic® Builder software, the first step is to connect the system to the vehicle:

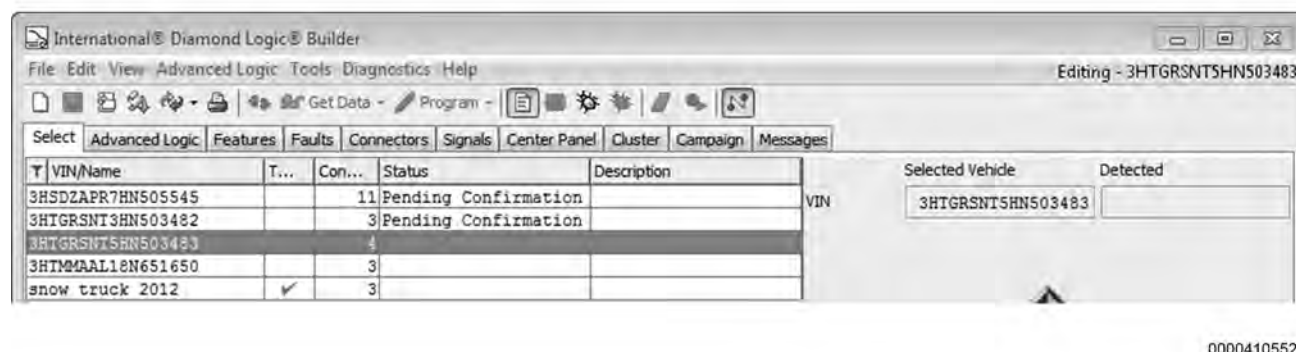


Figure 205 Tab

1. On the tab, the vehicle to be diagnosed.



Figure 206 Computer Link Icon

2. In the toolbar, click the Computer Link icon.

3. Verify that the connection is established by checking the icon in the lower-right corner of the window. This icon should show that the vehicle is connected.



**Figure 207 Computer Link Icon, Connected**

**NOTE – When in Diagnostic Mode the gauge cluster will act erratic. This is normal.**

4. In the toolbar, click the Diagnostic Mode icon.



**Figure 208 Diagnostic Mode Icon**



**Figure 209 Diagnostic Mode Icon, ON**

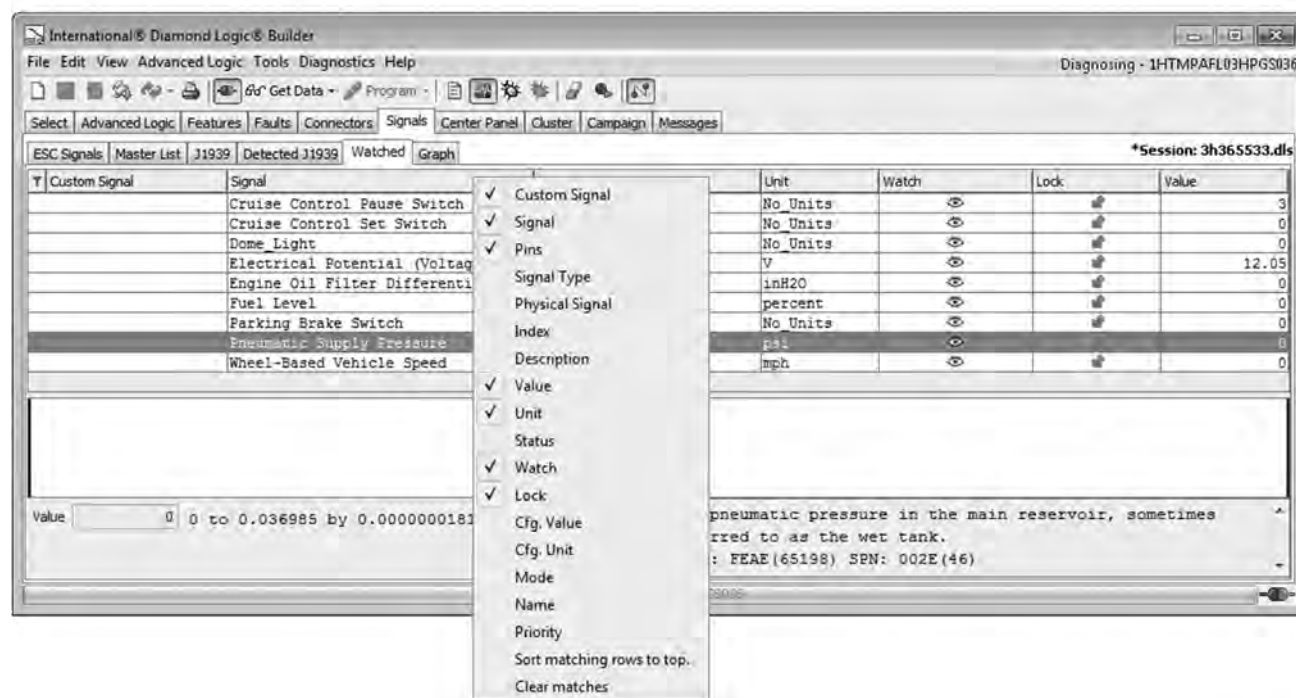
When Diagnostic Mode is ON, the icon appears indented in the toolbar.

## USING THE SIGNALS TAB TO DIAGNOSE ISSUES

When the Diagnostic Mode is started, an extra data column is added to the Signals tab and the Advanced Logic tab. This column is labeled Lock. The Watch and Lock columns are essential in performing diagnostic troubleshooting. The Watch Column appears as a closed eyelid. Single clicking on the closed eyelid changes it to an open eye. This enables the signal for diagnosis in real time. The value of the signal may be viewed in the Value column.

If any of these columns are not visible:

1. Right-click on any of the column headings. This produces a menu that lists all the columns that may be displayed in the table.
2. Ensure that the Custom Signal, Signal, Pins, Value, Unit, Status, Watch, and Lock columns are turned on (checked) as a minimum. If desired, other columns may be checked as well.



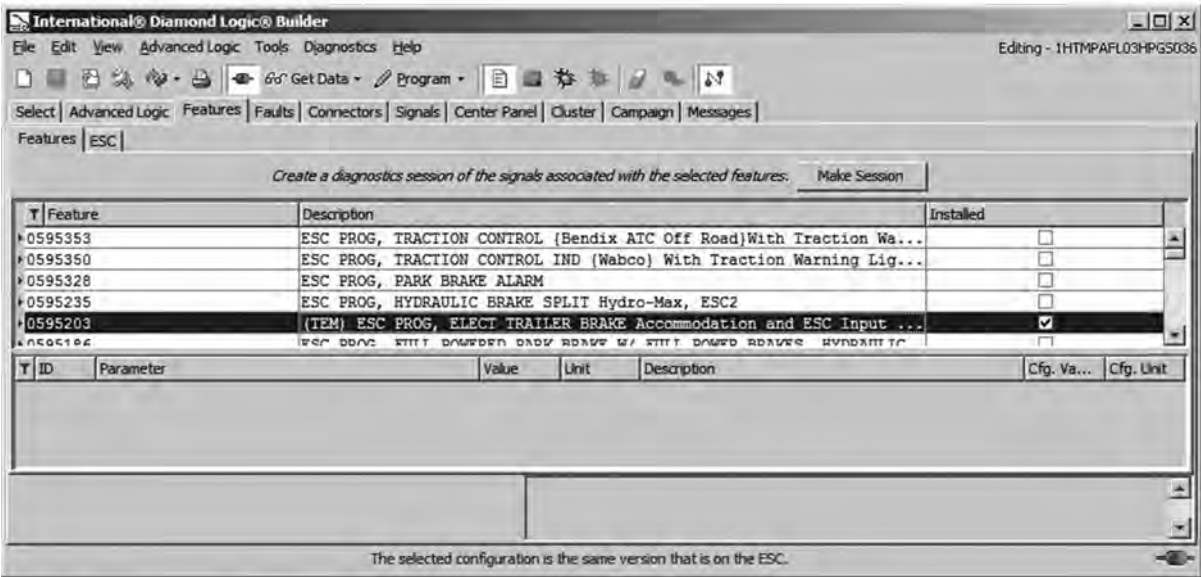
0000413555

Figure 210 Signals Tab with Columns Appropriate for Diagnostics

Using Make Session to Select WATCHED Signals

Clicking Make Session on the Features tab will open a Signals tab session that displays the signals related to the selected feature.

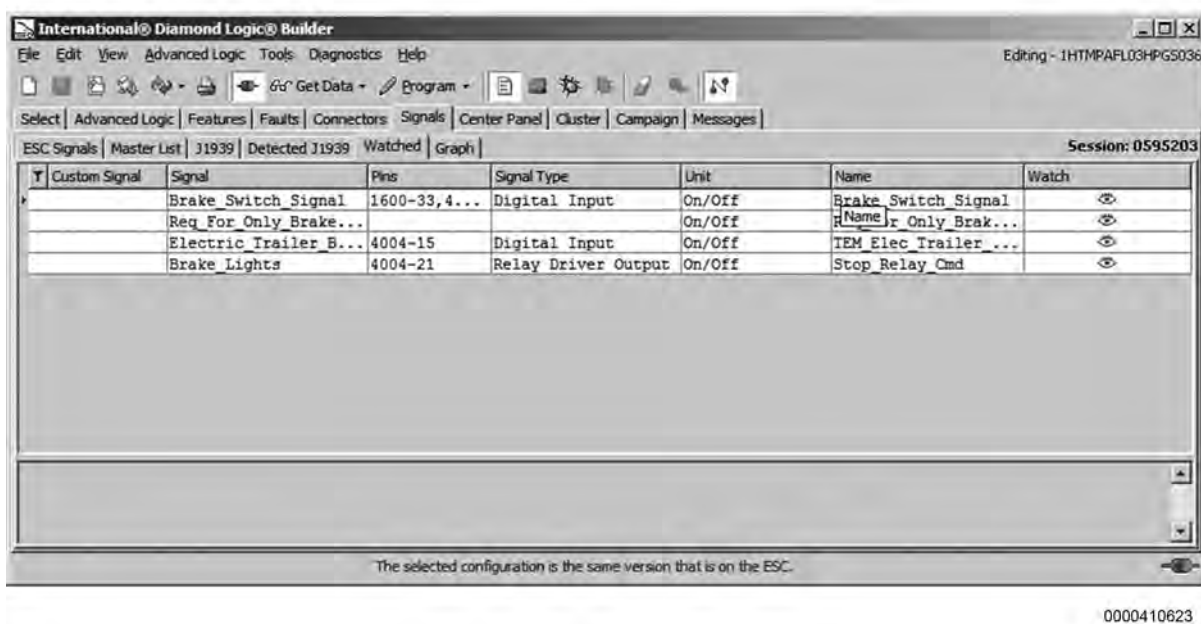
1. Select the Features tab.



0000410581

Figure 211 Features Tab

2. Select (click) the feature whose signals you want to watch.
3. Click Make Session to open the Signals tab with the Watched sub-tab selected. The signals that apply to the selected feature will be listed.



**Figure 212 Watched Sub-Tab**

4. If desired, add additional signals by doing the following:
  - a. Select the ESC Signals sub-tab.
  - b. Click the eye icon for each additional signal you want to watch.

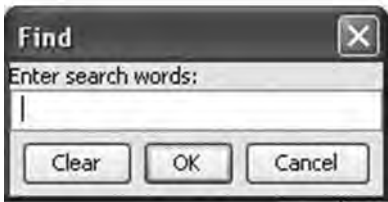
Using Signal Status while Diagnosing

Each signal in the Diamond Logic® electrical system has an associated Status or health. A Status value of zero indicates a good signal status. Any other value for status indicates that the signal health is bad and will not be used by the program logic. When troubleshooting, it is essential that the user inspect the Status of system signals being tested to ensure that they have a value of zero. If any of the values are greater than zero, then go to the Faults tab and look for diagnostic trouble codes.

**NOTE – Many signals that have bad status, such as the HVAC thermistors, no longer have related fault codes.**

To quickly find signals that the user wishes to watch:

1. On the Signals tab or the My Variable panel of the Advanced Logic tab, click the Filter button on the left end of the table heading.



0000410620

Figure 213 Find Window

2. Enter the word or words to search for.
3. Click OK.

By observing the data in the Value column, the user can monitor the value of selected signals. ON / OFF signals are represented by a check box where the signal is ON when the box is checked. Also observe the Unit column to see the unit of measure associated with the signal value.

Select Advanced Logic Features Faults Connectors Signals Center Panel Cluster Messages									
ESC Signals Custom Master List Watched Graph			Session: Turn Signal Lights						
Custom Signal	Signal	Pins	Signal Type	Value	Unit	Status	...	...	Name
Accessory	Accessory	1600-2	Digita...	<input checked="" type="checkbox"/>	On/Off	0			Ac...
	LT FT Turn FET Status		Digita...	<input checked="" type="checkbox"/>	On/Off	0			LT...
	LT RR Turn Cmd	4008-C	Digita...	<input type="checkbox"/>	On/Off	0			LT...
	LT RR Turn FET Status		Digita...	<input checked="" type="checkbox"/>	On/Off	0			LT...
	LT Turn Signal Ind Cmd	J1939 ...		<input type="checkbox"/>	On/Off	0			LT...

0000410624

Figure 214 Observe the Value and Unit Columns



### Forcing Signal Values

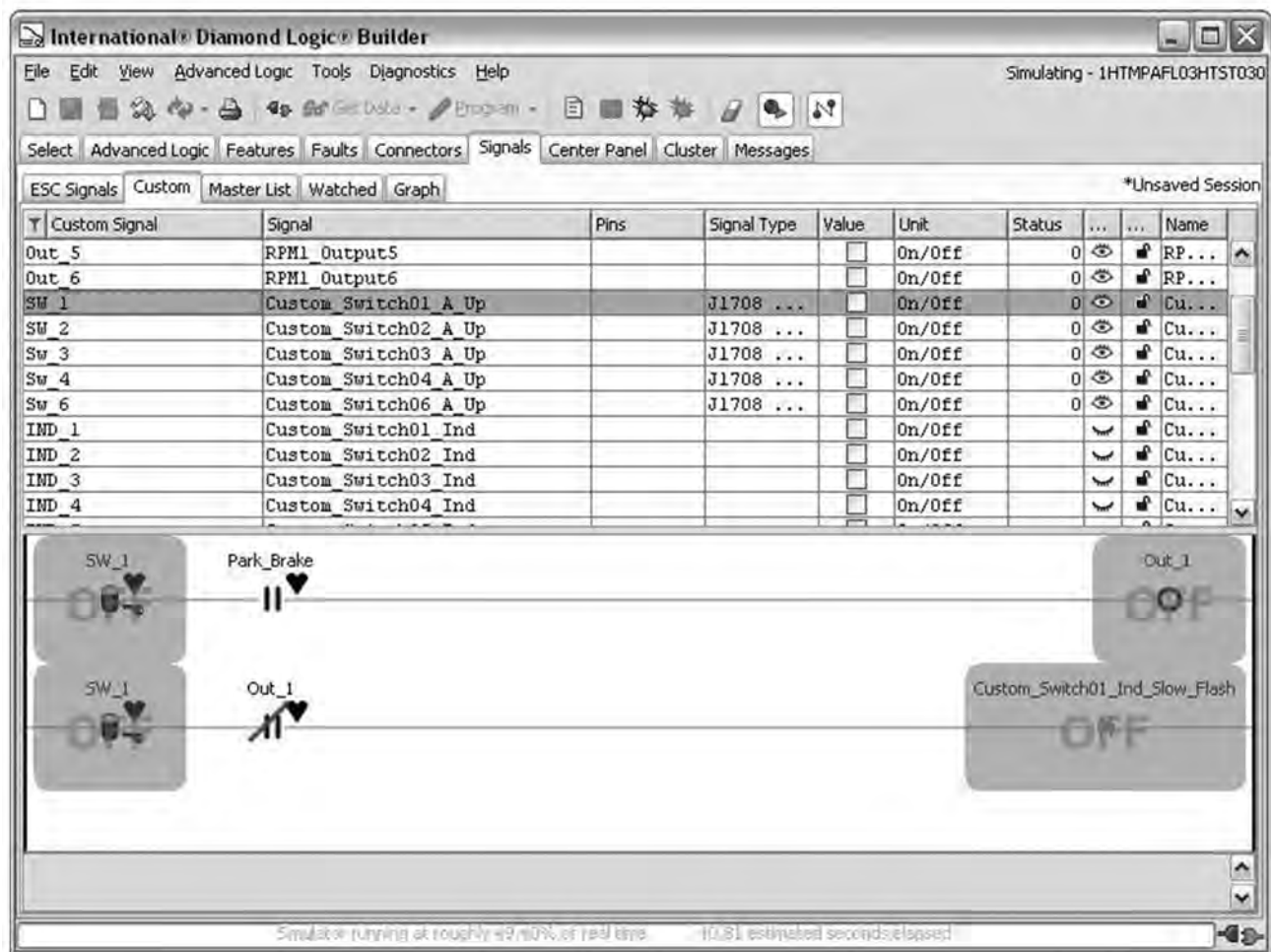
In addition to monitoring signal values, the user can also force signals to a predetermined value. For example, the Accessory signal can be forced ON or OFF just by checking or unchecking the box in the value column on the Accessory line. The accessory voltage is not actually being forced ON or OFF, but from an ESC / BC programming logic standpoint it is. Therefore, all the features or Advanced Ladder Logic that use the Accessory signal will respond according to the ON / OFF state of Accessory.

Once a signal is forced to a new value, the Lock icon in the lock column will show as locked. When locked, changes by external inputs such as switches or sensors will be ignored.

To restore the signal to an unlocked condition, click on the Lock icon; now the signal will respond to normal system inputs and outputs. Alternately, unlock all locks by taking the DLB software out of Diagnostic Mode. You will have to return to Diagnostic Mode to continue diagnosing.

Signals and Custom Logic

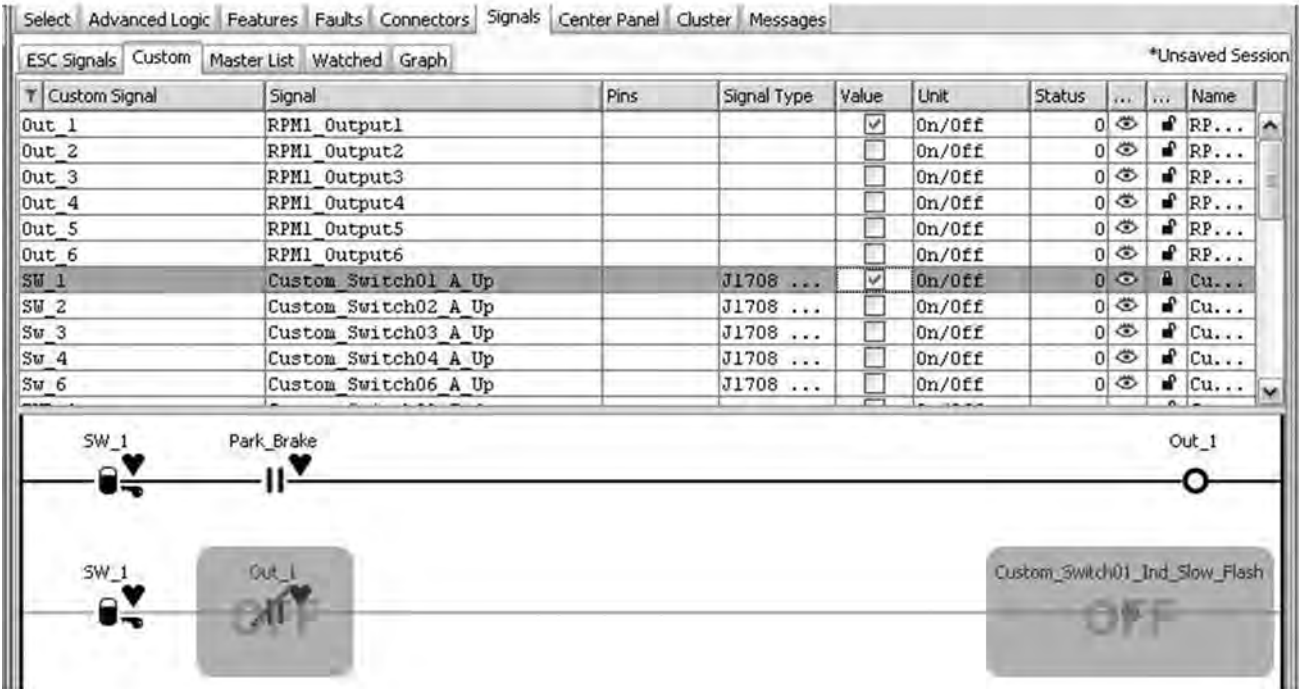
It is also possible to examine Custom Signals and Ladder Logic on the Signals tab. An example is shown in the figure below.



0000410616

Figure 215 Custom Values and Ladder Logic

In the first Ladder Logic rung, there is SW\_1 and a Park\_brake; SW\_1 is off as indicated in the grayed area. In the signal listing, clicking the SW\_1 Value check box turns on the switch.

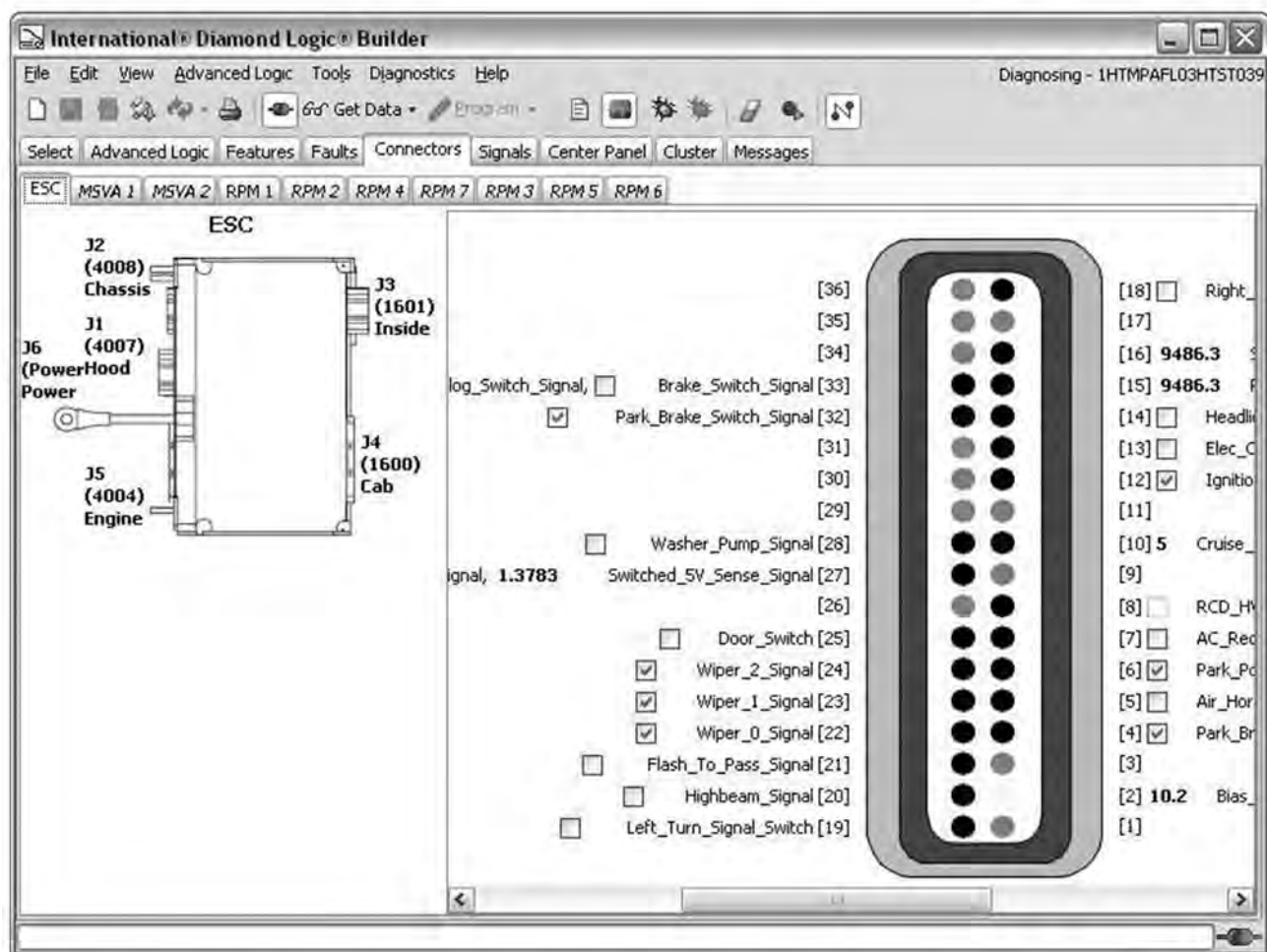


0000410617

Figure 216 SW\_1 Switch is ON

## USING THE CONNECTORS TAB TO DIAGNOSE ISSUES

Signal values that are present on physical pins of various electrical modules can be observed by selecting the Connectors tab. Note that there is a tab for each module. Use the connector view to help isolate the problem. The connector views provide the ability to monitor system values without the use of breakout boxes. Scaled voltages, temperatures, and pressures are presented for analog voltages and checkboxes are provided for ON / OFF values.



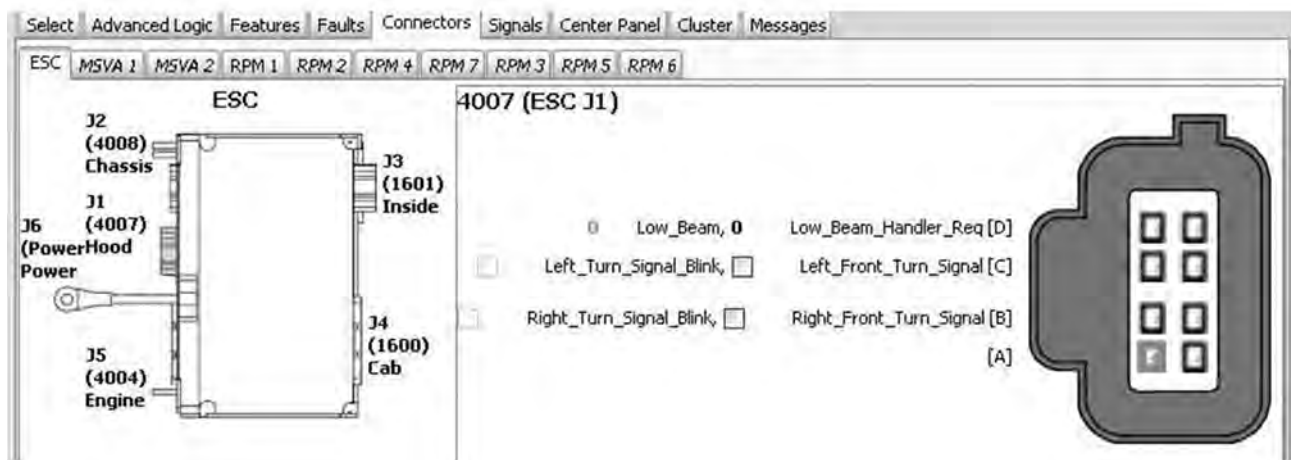
0000410618

**Figure 217 Connectors Tab**

On the Connectors tab, you can observe the state of each input and output from the ESC / BC and each RPM and MSVA. You can also override each input and output.

To view individual inputs and outputs:

1. Select the sub-tab for the module that you wish to view. The sub-tab displays an image of the module and its connectors on the left.
2. Select a connector in the image on the left by clicking on it. The selected connector becomes shaded in gray and is displayed on the right.



0000410619

**Figure 218 Selected Connector Displayed on Right**

RPM Output Connector View

The figure below shows the output connector for RPM 1. To select an output, click on its name. The selected name and the corresponding pin in the connector drawing will appear highlighted in YELLOW. Selecting an output in this way will also automatically select this output in the Signals tab. This is very helpful if you are not sure of the feature code that controls a particular RPM output. To turn off the YELLOW highlight, hold down the Ctrl key while selecting an output.

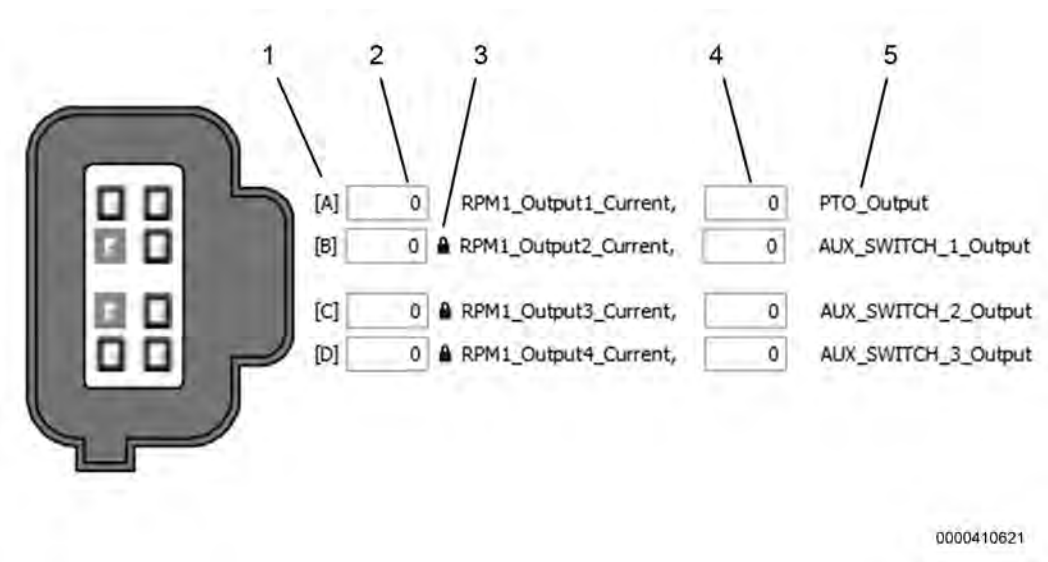
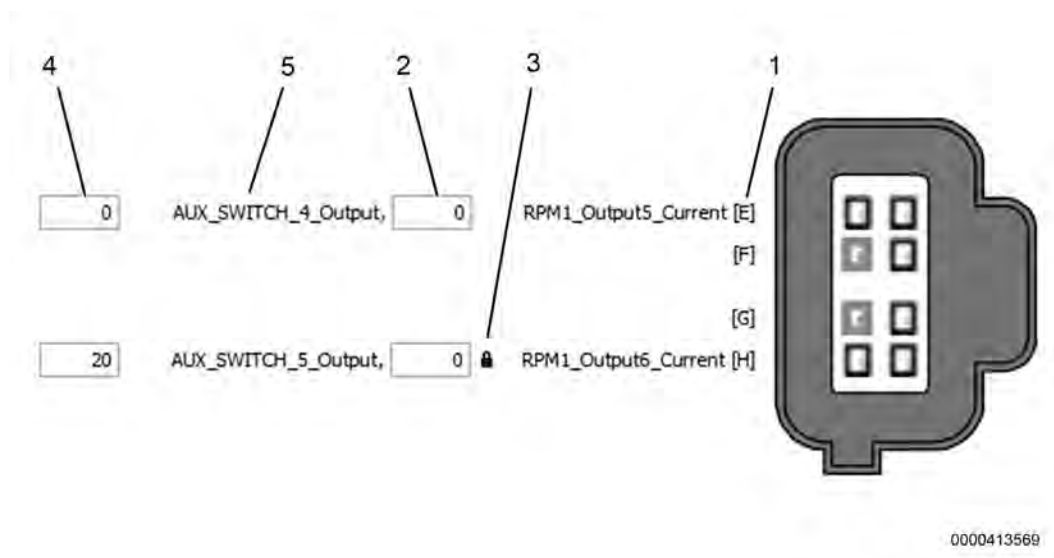


Figure 219 RPM Output Connector View, Outputs on Right (Typical)

Several pieces of information are displayed for each output: (Refer to figure above for numbered items.)

Item	Description
1	Cavity pin numbers (shown in brackets)
2	Entering a voltage here sets the value of this output to the entered value.
3	<p>The lock icon is used to lock and unlock the output to the value entered to the left (Item 2). When locked, no other signal can drive that output. (When unlocked, a blank space appears here. Click the blank space to lock the output.)</p> <p><b>NOTE – If you are having trouble with outputs not turning ON or OFF as expected, check to make sure those outputs are unlocked.</b></p>
4	The current level (in Amps) that this output must reach in order to trigger the virtual fuse configured for this output. The default is 20.
5	<p>The name assigned by the feature that is using this output.</p> <p><b>NOTE – A bold output name would indicate that a custom name has been assigned to this signal by advanced logic.</b></p>

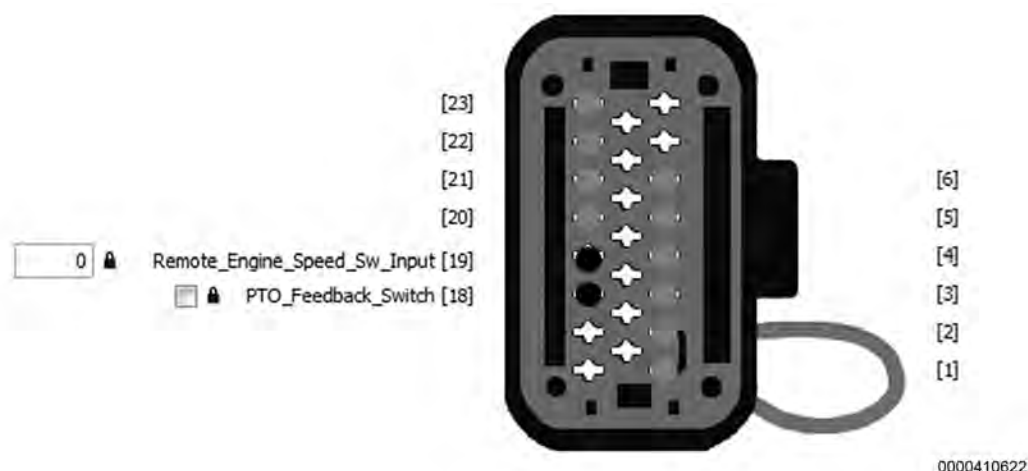
Information about the outputs on the left of the connector are displayed in roughly the opposite order.



**Figure 220 RPM Output Connector View, Outputs on Left (Typical)**

### RPM Input Connector View

Input connectors, like the example shown below, are represented in a similar manner as output connectors, with some minor differences.



**Figure 221 RPM Input Connector View (Typical)**

Each pin of an input connector can be programmed in the ESC / BC to respond to either a 12V signal or a ground signal.

The lock works the same as it does on the output connector.

The input connector will also show the addressing; note the jumper wire between pins 1 and 2. Jumper wires on the input connector determine how an RPM is addressed. Addressing is extremely important. RPM input connectors should not be moved around. Doing so will move all inputs and outputs programmed to that particular RPM.

## DIAGNOSTICS ON THE ADVANCED LOGIC TAB

### Diagnostics Sub-Tab

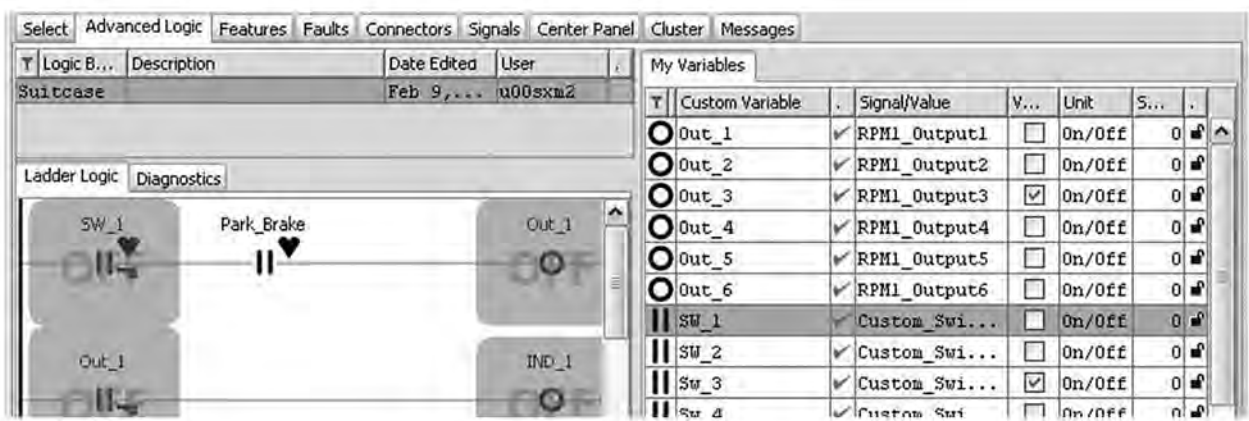
The Diagnostics sub-tab allows the Advanced Logic writer to provide information regarding the advanced logic. If such documentation has been provided on this sub-tab, it may contain valuable information for diagnosing the advanced logic.

### Ladder Logic Sub-Tab

Diagnostics in the ladder view are simple and straightforward:

1. Connect to the truck.
2. Enter Diagnostics Mode.
3. Select the Advanced Logic tab. On this tab, GRAY OFF or BROWN question mark shadow blocks will be seen over most items. BROWN shadow blocks indicate items that the present state cannot be determined. On the right of the window, you will see the tabs that contain all the signals that can be used in advanced logic.
4. At this point, you can observe actual signals received from the truck.

For example: while hooked up to the vehicle, in Diagnostic Mode and on the Advanced tab, you can observe the actions on the vehicle. The figure below (Figure 222) shows an advanced block with a switch in the first rung of the ladder logic. There are two ways of testing to ensure the vehicle is working properly. The first is to actually activate the switch in the vehicle and watch for the outcome on the screen. The second is to override the switch and click the checkbox in the value column on the right of the screen. Clicking the checkbox is the way to test out the advanced logic in the simulate mode. This tells the ESC / BC to ignore the switch state and activate the circuit regardless of switch location.

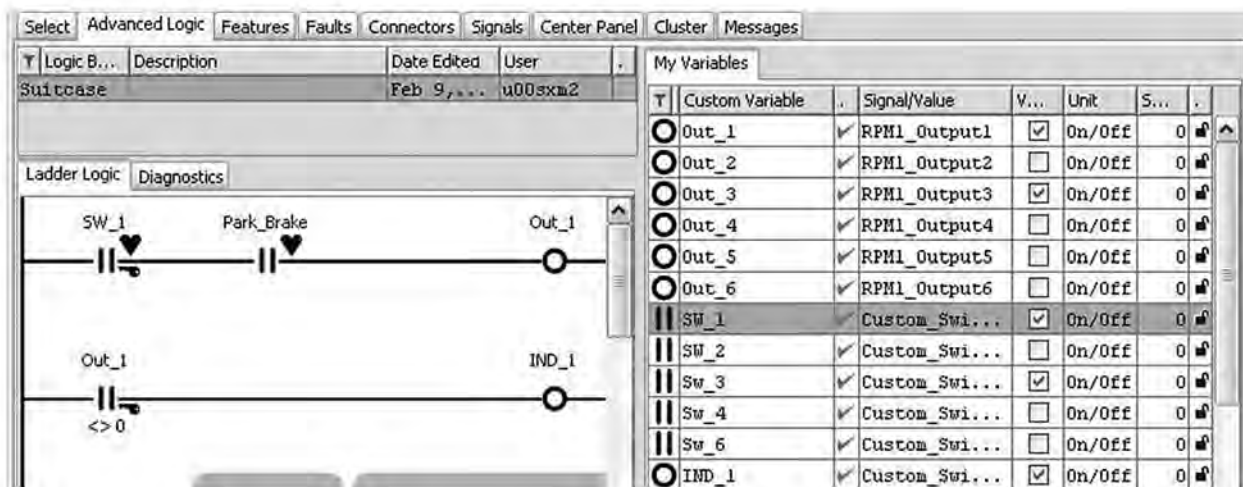


0000410804

Figure 222 Advanced Logic Block with a Switch in the First Rung



The next figure shows the same view with the switch in the up position. Notice on the left side of the window, the graphic display shows that the switch and corresponding outputs are now in the ON position. The right side of the screen now has checkmarks in the items that have been set to ON. Returning the switch to the OFF position will once again turn OFF the switch and the switch outputs.



0000410805

**Figure 223 Switch in First Run is Now ON**

Each of these techniques has value. For items such as switches and the park brake, it is very easy to either turn them ON or OFF. However, for items such as intermediate variables created in the ladder logic and RPM input signals, the value column is an excellent option. This overrides the vehicle signal. By observing the reaction of the logic rung, you can diagnose the vehicle. If all the items on the left side of the logic block are properly set, the value on the right should be either ON or OFF. If the contact, light, or output indicator is on in the Diagnostics tab, then the output should also be on; if not, check for a fault code in the Faults tab.

DIAGNOSTICS ON THE CENTER PANEL TAB

In Diagnostics Mode, the Center Panel tab displays images of the switches. A YELLOW line represents the multiplex data link tying the switch packs together. Arrows indicate the current switch setting of each switch. When the state of the actual switch is changed, the arrows and images will change and indicate the new state.

Diamond Logic® Builder can override switches.

When Diamond Logic® Builder is used to cycle switches, the arrows and images will change, indicating the new state. Additionally, the padlock icon will appear, indicating a locked condition.

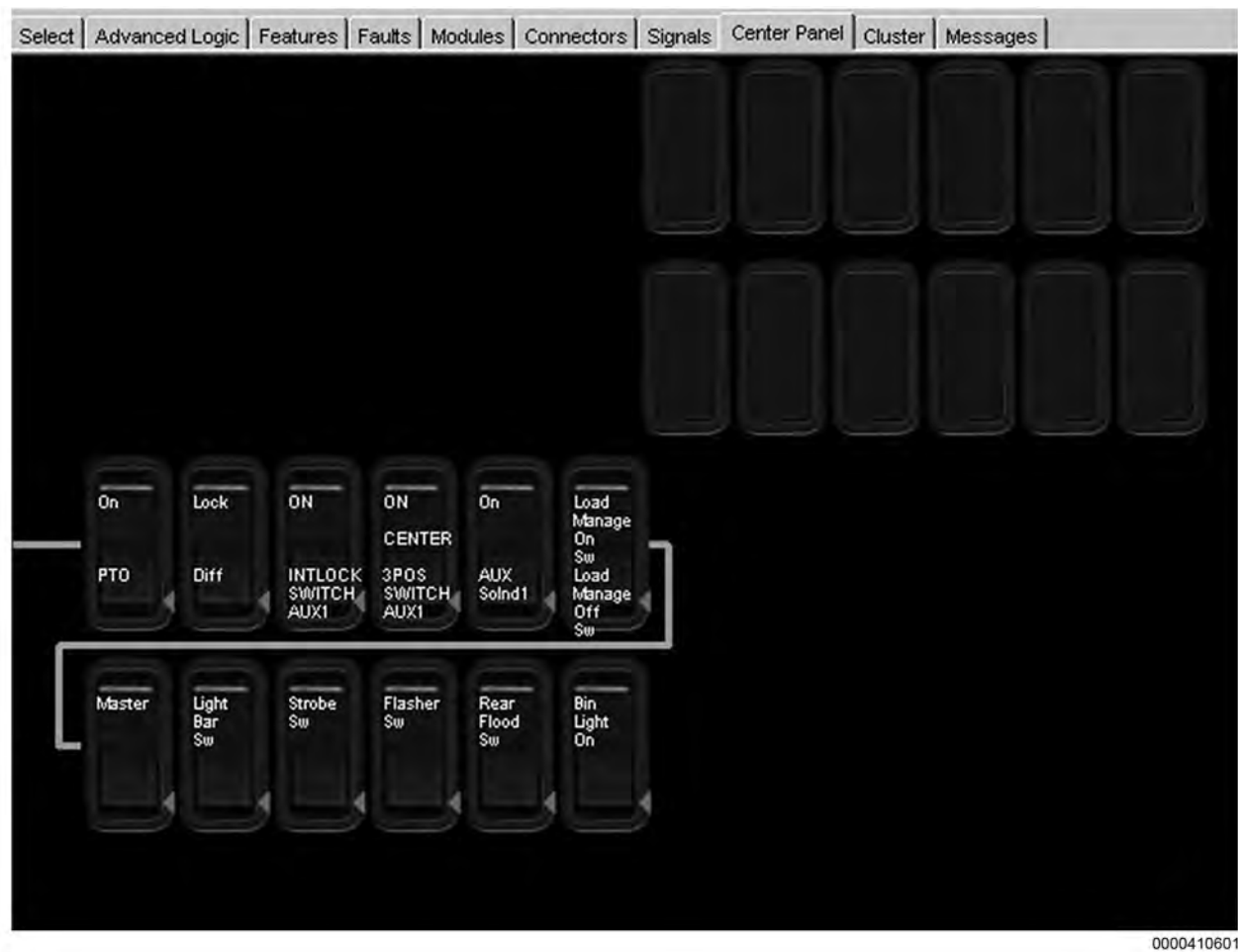


Figure 224 Center Panel Tab

To override a switch, either left-click on the desired switch setting or right-click on the switch and select a desired setting from the right-click menu.



**Figure 225 Switch Right-Click Menu**

Clicking the top portion of the switch will activate that switch output and the arrow will move to the up position. This overrides the switch and allows you to determine if there is a switch problem.



**Figure 226 Switch in ON Position, with Lock**

The padlock, which appears on a switch, allows you to lock that signal in any of the switch's valid positions. Click on the lock to remove it.

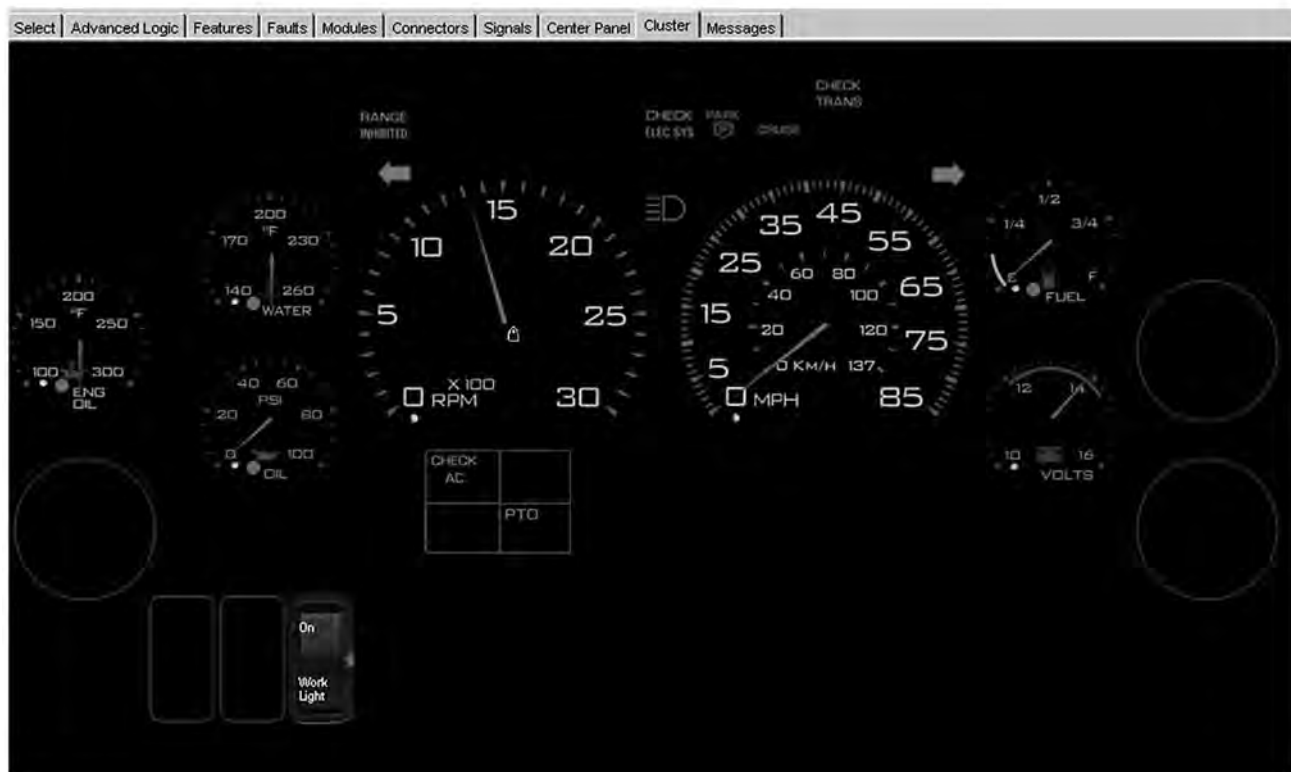
When diagnosing switches, it is important to remember a few facts:

- The switch rocker is nothing more than a pair of plungers. When a switch is pushed, it pushes one of the two plungers in and contacts a micro switch in the switch pack.
- Each switch location has two micro switches. The switch can be in 1 of 3 valid states; micro switch 1 is depressed, micro switch 2 is depressed, or neither micro switch is depressed.
- When diagnosing a switch by checking the box in the Signals tab, the Features tab, or the Advanced Logic tab (while in either Diagnostic Mode or Simulate Mode), you must select the switch position you want, such as the switch up position. You must also make sure that the switch middle and switch down boxes are not checked. If you have more than one switch state selected in the Advanced Logic tab or the Signals tab, your switch will show yellow in the Center Panel tab. This tells you that you have put the switch in an illegal state.
- Turn OFF or unlock the individual switch signals in the Signals tab before you continue with diagnostics or simulation with the Center Panel tab.

## DIAGNOSTICS IN THE CLUSTER TAB

When the Cluster tab is selected in Diagnostic Mode, the movement of the gauges mirrors the movements of the actual gauges. For example, if the fuel gauge does not appear to be working, you can check the gauge cluster view and see if the signal is driving the Diagnostic Mode gauge. If the gauge in the Diagnostic Mode is working, but the actual gauge is not, follow the Navistar troubleshooting guide to complete the diagnosis.

By placing the cursor on the outer ring of a gauge and clicking the left mouse button, the user can override the actual gauge signal. This forces the gauge to the reading indicated by the cursor location. In the illustration below, the tachometer has been clicked at the 1300 RPM mark.



0000410606

**Figure 227 Cluster Tab**

When observing the gauges in Diagnostic Mode, a gauge may momentarily dip to 0. This occurs because of the high update rate required by some gauges and an update may occasionally be missed. The speedometer and the tachometer are most susceptible to this anomaly because of their high update requirements. This is a normal condition and is not an indication of a defective gauge.

Double-clicking in an area around the center of a gauge will bring up a text box in which a specific gauge set value can be entered. The gauge should follow the diagnostic gauge setting. If the gauge does not follow the diagnostic gauge, then follow the Navistar troubleshooting guide.



0000410607

**Figure 228 Temperature Gauge Double-Click Box**

### DIAGNOSING AND CLEARING FAULT CODES

When DLB is in Diagnostic Mode, it will display fault codes generated by most modules communicating on the J1939 (CAN) Data Link.



**Figure 229 Diagnostic Mode Icon**

To enter Diagnostic Mode, click the Diagnostic Mode icon in the toolbar.

#### Erasing Faults



**Figure 230 Clear Faults Icon**

To erase faults:

1. Click the Clear Faults icon in the toolbar. A window like the one shown below will appear.



0000410611

**Figure 231 Select Modules Window**

2. Check the box next to each module that you wish to clear faults from.
3. Click OK to clear the faults from the selected modules.

If fault codes are still active, they will repopulate the Faults tab.

## Decoding Diagnostic Fault Codes

The user can decode diagnostic fault codes directly by selecting the Faults tab.

Select	Advanced Logic	Features	Faults	Connectors	Signals	Center Panel	Cluster	Messages
T	SPN	U.S.	B.I.T.	B.I.T.	U.S.	Message	Probable Cause	Module
	639	14	228	254	✓	1 Failed to receive PGN 65252.		Body Cont...
	612	14	25	2	✓	1 Analog channel 25 is out of range high.	Shorted h...	Body Cont...
	625	14	130	0	✓	1 Driver Door Module (two-door or four-door) (address 130)...		Driver Do...
	625	14	64	0	✓	1 Front Passenger Door Module (address 64) not communicati...		Front Pas...
	613	14	1	5	✓	1 HVAC Control Head diagnostic circuit loss of communicati...		Body Cont...
	639	14	255	254	✓	1 Failed to receive PGN 65279.		Body Cont...
	639	14	192	254	✓	1 Failed to receive PGN 65216.		Body Cont...
	612	14	2	2	✓	1 Analog channel 2 is out of range high.	Shorted h...	Body Cont...
	612	14	30	2	✓	1 Analog channel 30 is out of range high.	Shorted h...	Body Cont...

0000410489

**Figure 232 The Faults Tab**

The Faults tab provides a very comprehensive description of a diagnostic fault for the BCM / ESC including text description, probable cause, connector pin associated with the fault, and the module associated with the fault. Note these faults are only associated with modules communicating on the J1939 (CAN) Data link.

### Tips

- Diagnostic fault codes will only be viewable on the Faults tab while the ignition key is in the run position. The engine does not need to be running to view the ESC / BC codes.
- Diagnostic programs provided by the power train component suppliers can still be used to diagnose those systems.
- For all vehicles, the Diamond Logic® Builder program will show fault codes from the BCM. For more recent vehicle models, DLB may also show fault codes from the instrument cluster, from the door pod, and from the LCM. Diagnostic programs provided by the power train component suppliers can still be used to diagnose those systems.
- When diagnosing the gauge cluster with the Diamond Logic® Builder program, the pointers may not be stable. The pointers may be steered to 0 intermittently. This is normal. Do not replace the gauge cluster due to this anomaly. It is important that the user can steer the gauge to a nominal value and that the pointer does not stick or jump in the process.

Module Detection

The Diamond Logic® Builder program has a module detection function. The purpose of this function is to provide a quick look at which electrical system modules are communicating on a data link or should be communicating on a data link. Selecting the Detected Modules sub-tab will display the modules that are communicating on the Drivetrain J1939 Data Link. Selecting the Inferred Modules sub-tab will display all modules that are expected to be present in the configuration of the vehicle but are not communicating.

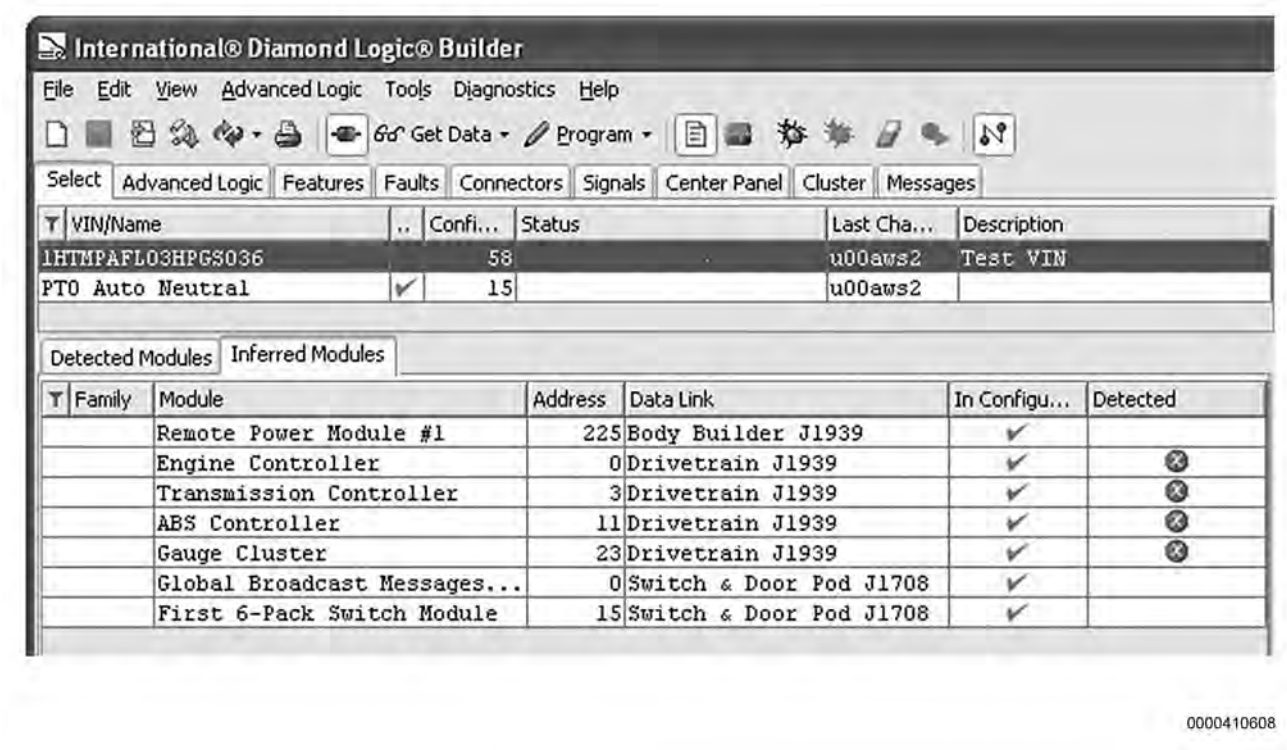


Figure 233 Inferred Modules

Modules that do not communicate on the Power Train J1939 Data Link (but do communicate on one of the other data links) will have a blank in the detected column. Currently the system accurately detects modules that are connected to the power train J1939 Data Link.

Modules that are not, but should be, communicating on the Power Train J1939 Data Link will have an X icon in the detected column. See the Inferred Modules figure above (Figure 233).



## USING SESSIONS AND TRIGGERS

The session function allows a user to save a custom group of signal selections to an electronic file, which can be used in the future. This allows the user to quickly select a set of signals to use during diagnostics. Sessions can only be used in Diagnostic Mode. Selected signals and trigger settings are also saved in the session.

**NOTE – Creating and saving sessions is not recommended. Clicking Make Session while viewing the Features tab will open a signal session displaying the signals related to that feature. This should meet most of your Signal Session requirements.**

### OPENING A SESSION

If you have previously saved any sessions, you can reopen them. To open a session:

1. In the menu bar, select Diagnostics > Open Session.

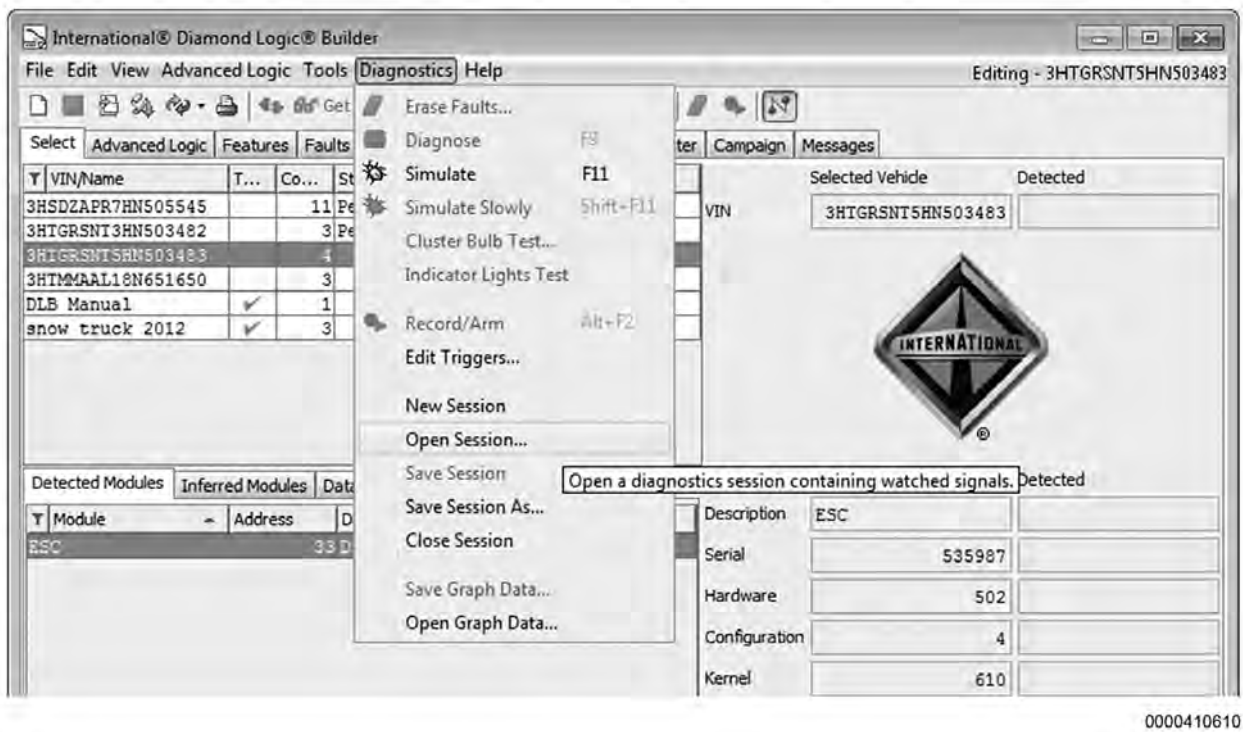


Figure 234 Opening a Session

A window that prompts the user for the location and filename of the desired session appears.

2. Select the session file to be loaded.

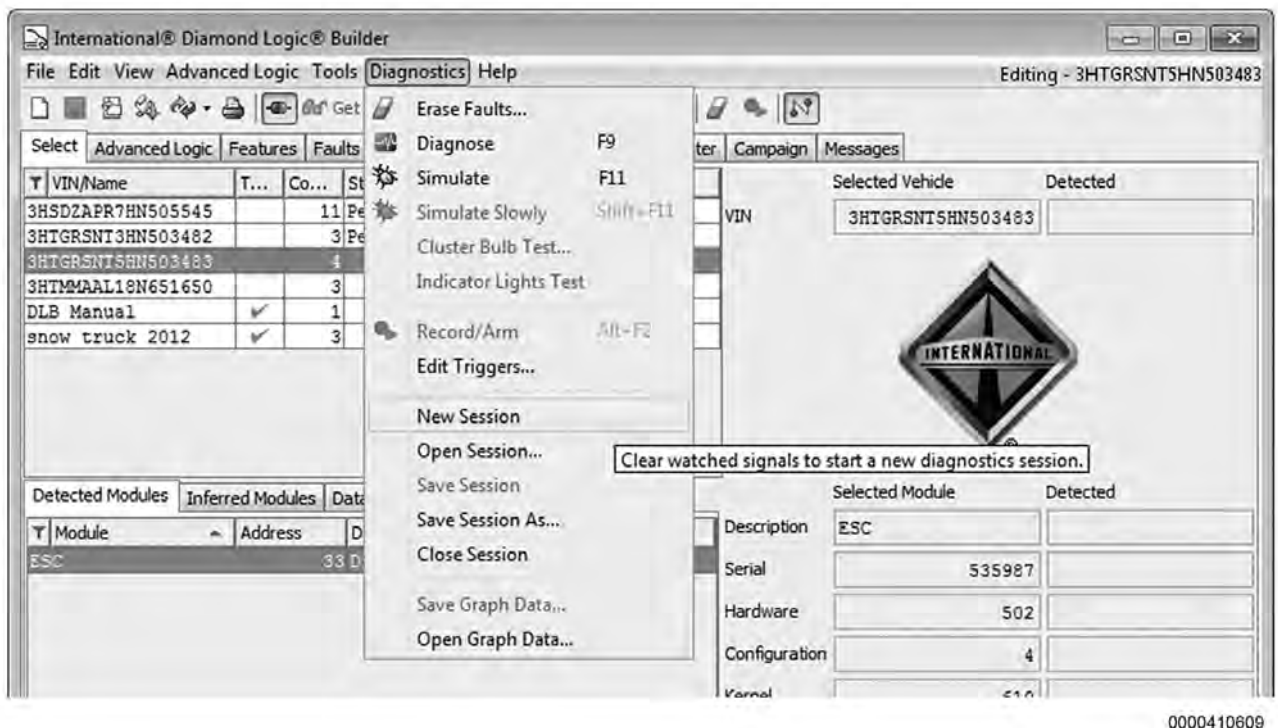
After a session has been loaded, the session's signals can be viewed on the Signals tab. Select the ESC Signals sub-tab to view all signals in the vehicle configuration that are present in Navistar®-designed features on the vehicle. Select the Watched sub-tab to see a listing of signals used in the selected session.

### CREATING A SESSION

Creating and saving sessions is not recommended. It is better for most users to click the Make Session button on the Features tab. This opens a signal session that displays the signals related to the selected feature. Refer to Using Make Session to Select Watched Signals (page 181). This should meet most of your session requirements. The following information is provided for advanced users who might need to use the Graphing and Trigger functionality in DLB.

To create a session:

1. In the menu bar, select Diagnostics > New Session.



**Figure 235 Creating a New Session**

2. Select the Signals tab.
3. Select the sub-tab that lists the signals to be watched:
  - The ESC Signals sub-tab lists all signals in the vehicle configuration that are present in Navistar®-designed features on the vehicle.
  - The Custom sub-tab lists all ladder logic signals that have been created in Advanced Logic.
  - The Master List sub-tab lists all possible signals in the Diamond Logic® electrical system. Note that the vehicle being diagnosed will only have a small subset of the Master List of signals.
4. In the chosen sub-tab, use the search utility to find the signals to graph or record.

- 5. Enable each signal to be watched by clicking the eyelid icon next to the desired signal. When the eyelid changes to an open eye, the signal is selected.
- 6. Select the Watched sub-tab to see the list of all selected signals. Verify that all desired signals are listed. In the figure below, BC\_RCD\_Tempt\_In\_Raw\_Signal, BC\_RCD\_Temp\_Out\_Raw\_Signal, and Switched\_5V\_Sense\_Raw\_Signal have been selected.

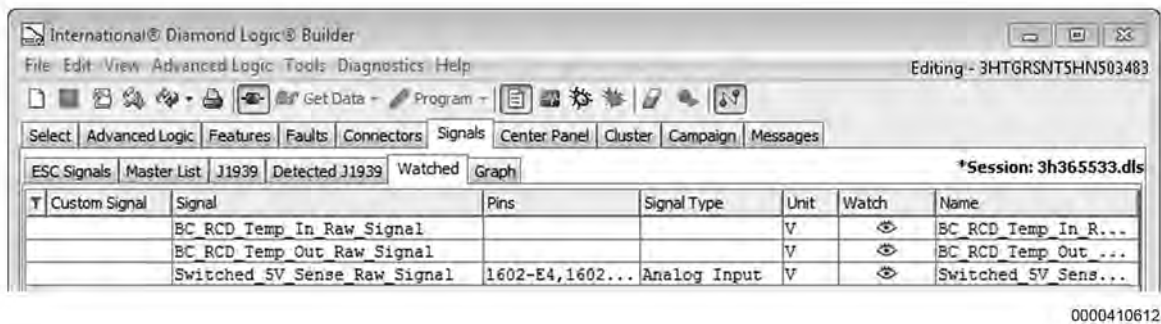


Figure 236 Selected Signals on the Watched Sub-Tab

- 7. In the menu bar, select Diagnostics > Save Session. The Save Session window appears.

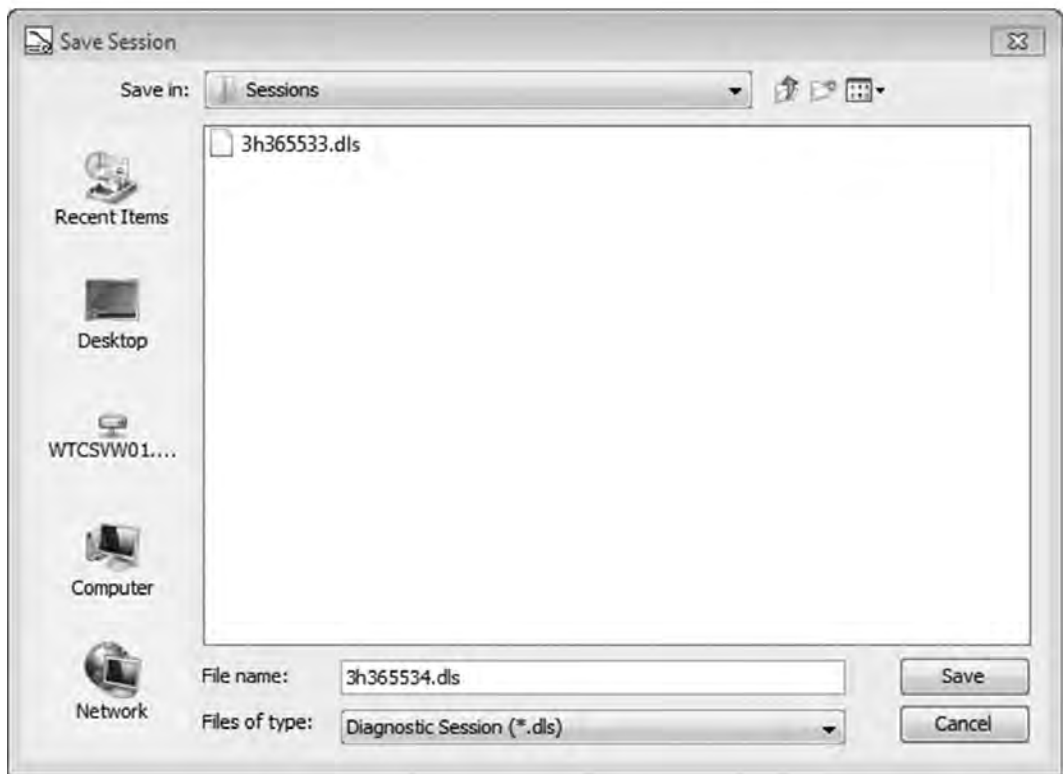


Figure 237 The Save Session Window

## USING SESSIONS AND TRIGGERS

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8. Navigate to the folder in which this session should be saved and enter a filename for this session. The example above uses the name 3h365533.
9. Click Save.

The signals chosen to watch can be retrieved as a session file with the name entered. All session files are given the .dls file name extension. For example, the full name of the file whose name is being entered in the figure above will be 3h365533.dls.

In addition, this file can be sent by email.

# SELECTING SIGNALS FOR RECORDING AND GRAPHING

In this example, we will watch two switches set up in custom logic and the associated indicators for the switches.

1. Select the Signals tab and then the ESC Signals sub-tab.

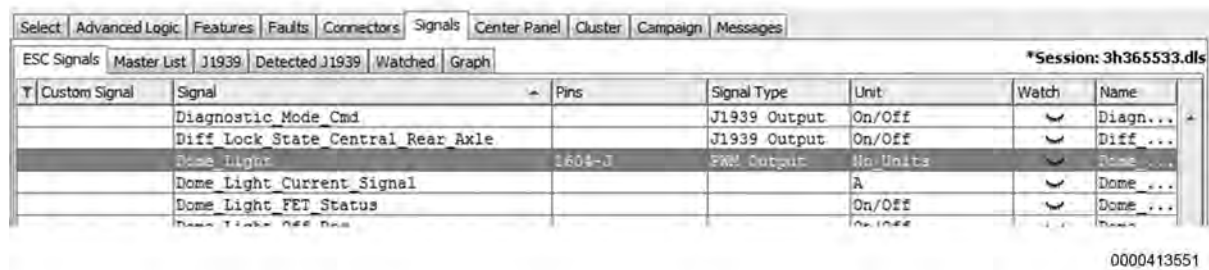


Figure 238 ESC Signals Sub-Tab

2. Click the Custom Signal heading to move custom signals to the top of the list.



Figure 239 Not Watched Icon

3. Select each signal to be watched by clicking the Not Watched icon for each desired signal.



Figure 240 Watched Icon

The icons will change to indicate that the corresponding signals are now Watched.

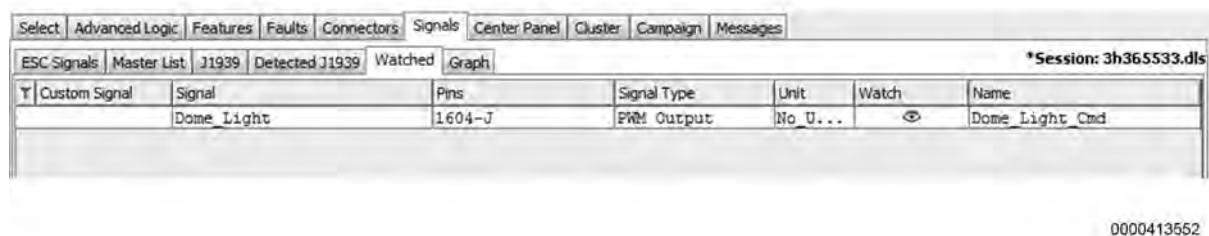


Figure 241 Watched Sub-Tab

4. Select the Watched sub-tab. Verify that the desired signals are now listed here.
5. Select the Graph sub-tab.



**Figure 242 Recorder Icon**

6. Click the Recorder icon in the toolbar.

**NOTE – The Recorder icon can be selected only while DLB is in Diagnostic Mode. Therefore, graphing can be performed only while DLB is in this mode.**

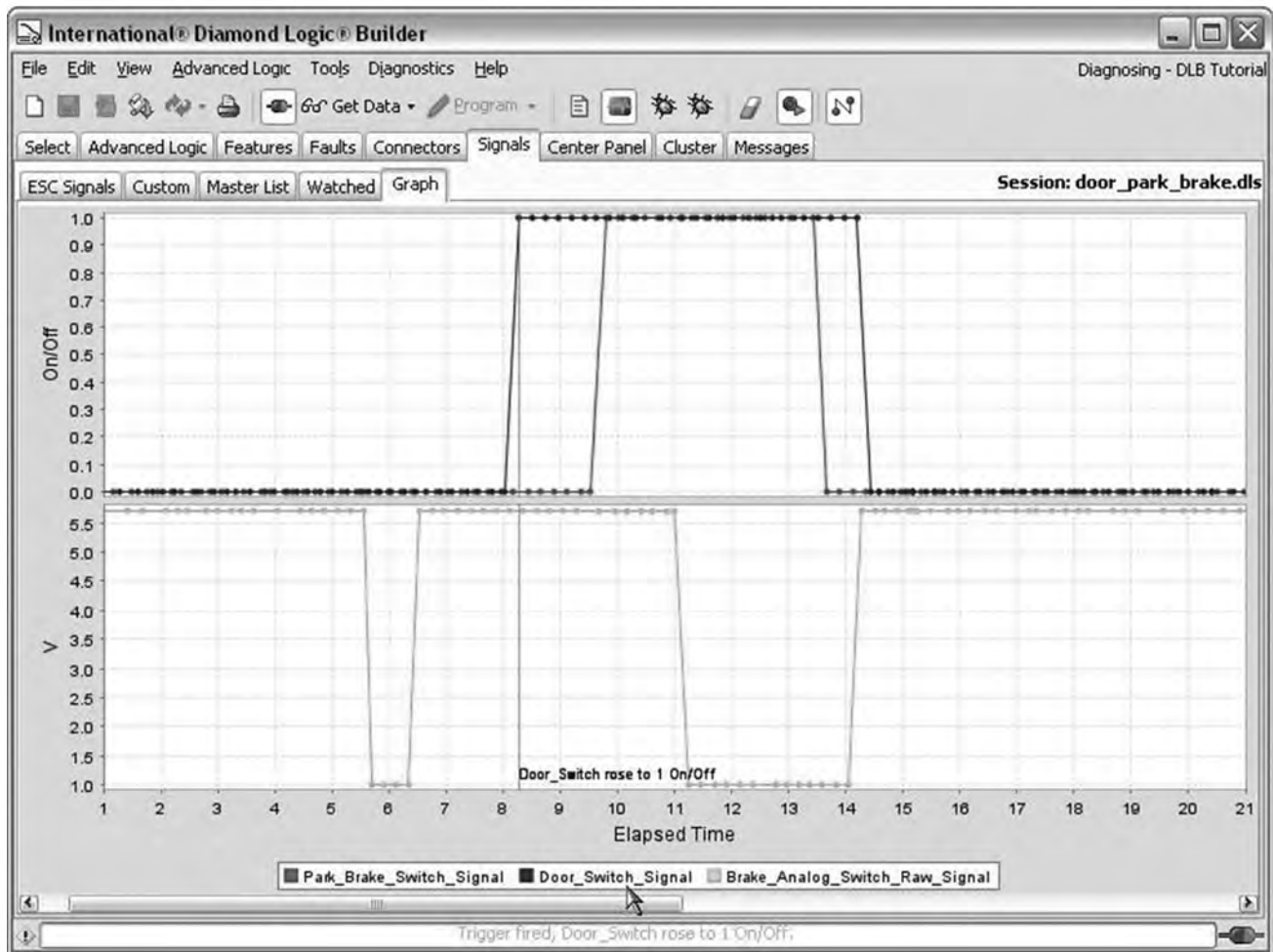


**Figure 243 Diagnostic Mode Icon**

7. Click the Diagnostic Mode icon in the toolbar to enter Diagnostic Mode.

**NOTE – DLB will not switch to Diagnostic Mode unless it is connected to a vehicle and communicating with the ESC / BC.**

The graph below shows the results of turning ON Switch 1 and Switch 2 then turning OFF Switch 2 and Switch 1.



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**Figure 244 Graph Showing Switches Being Turned ON and OFF**

The Recorder icon in the toolbar both starts and stops the recording of data to the graph. Additionally, it arms the triggers. If no triggers have been set, recording to the graph continues until the user stops it by clicking the Recorder icon again. If there are triggers set, the user can still manually stop the recording by clicking this icon.

### Recording and Graphing Views

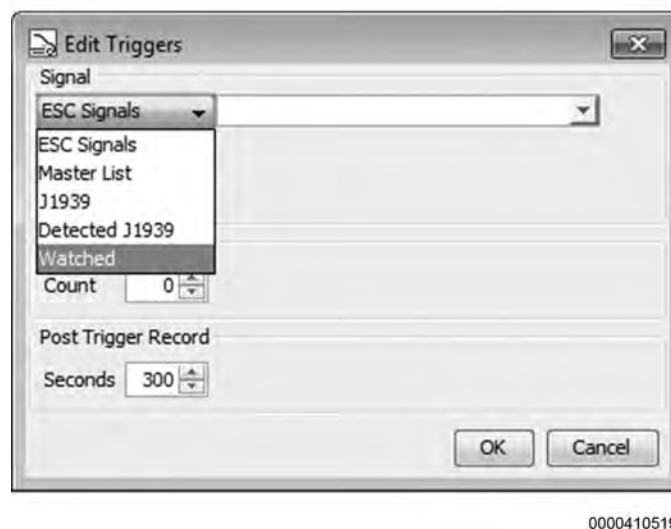
The Graph sub-tab shows data formatted in specific scaled data views, such as volts, pressure, or digital ON / OFF signals shown as a 1 or a 0. The graphing area is divided into as many views as are required to display all the data types. Therefore, it is desirable to keep the number of signal types watched to three or less. All signals of a given data type will be displayed on the same graph. Therefore, the user should minimize the number of signals that are watched on any single graph. The graphical recorder is able to record a single new data point every 50 milliseconds (0.050 seconds). Therefore, it is important to minimize the total number of signals watched to less than 10 to maintain a close representation of the real time graphing of the signals. Watching more than 10 signals will result in possible missed signal transitions on the graph, plus the graph will be hard to read.

### USING THE TRIGGER FUNCTION

Triggers are used to detect a condition and mark it on the graph. Triggers can also stop the recording on the graph after a specified amount of time so the trigger condition does not get lost. If you kept recording forever the trigger would be lost 10 minutes after it fires because DLB will only keep a maximum of 10 minutes of data. The recorder must be started to begin the trigger process. The system will begin recording even though the trigger event may not have occurred yet. When the trigger does occur, the graph will be marked with a start line. The recording will continue until the selected amount of time has elapsed, the graph is stopped manually, or the maximum recording time has expired.

#### Setting Up a Trigger

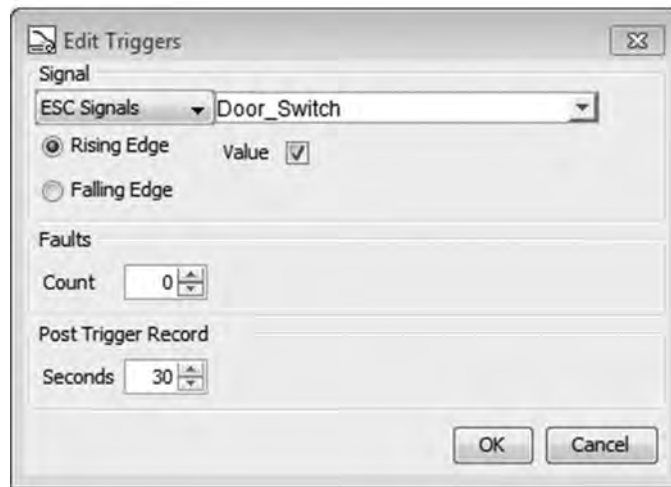
In the menu bar, select Diagnostics > Edit Triggers. The Edit Triggers window appears.



**Figure 245 The Edit Triggers Window**

The drop-down menu in the upper-left of this window allows you to choose the category of signal to view. Once a category is selected, use the drop-down menu in the upper-right to choose the individual signal to use as a trigger. The trigger can be set up to detect when the signal goes active (Rising Edge), when the signal goes inactive (Falling Edge), or when it reaches a specific value. The trigger may be delayed until the occurrence (Fault) has occurred after a specified number of counts. Finally, the trigger may be set to stop recording after a specified time.





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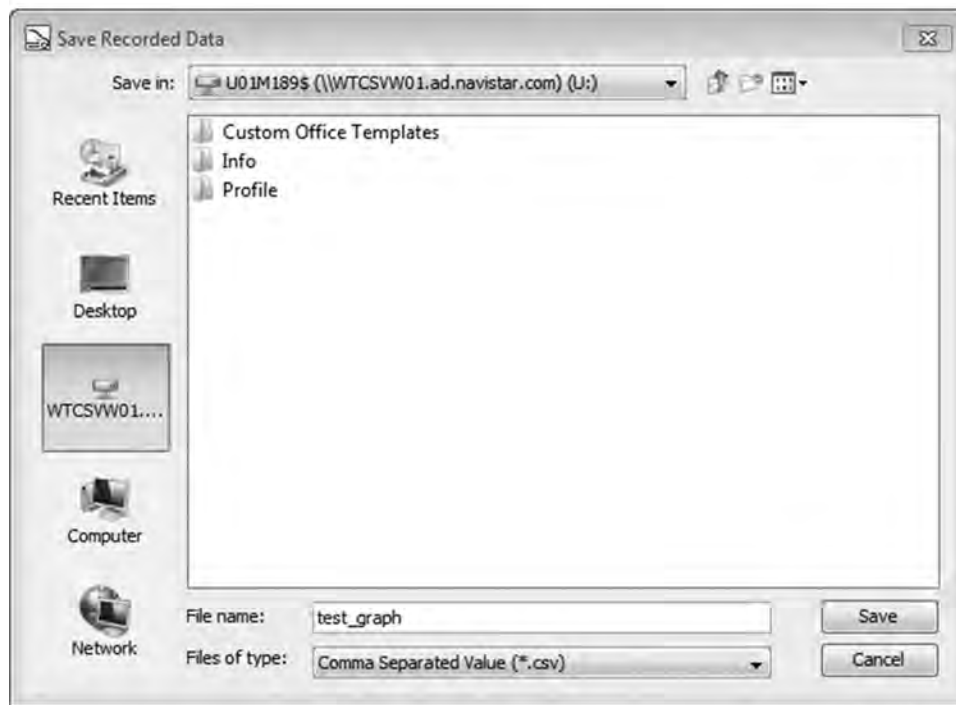
**Figure 246 Trigger Example**

Once a signal is selected, the trigger may be set to fire when a specified value has been detected. The example above shows that a trigger has been set to fire when the Door\_Switch signal turns ON. The trigger will stop recording 30 seconds after the trigger event occurs.

### **Saving and Viewing the Graph**

The graphed data can be saved in a file that can be read with Microsoft Excel or reopened in DLB for future reference. To save the graph data:

1. In the menu bar, select Diagnostics > Save Graph Data. A window will open prompting you to name the file and select a location for saving the file.



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**Figure 247 Saving Graph Data**

2. In the File name box, enter a name for the saved data file. (Graph data is saved as a .csv file, which is a plain text file containing comma separated values.)
3. Click Save.

A saved graph file can be reopened with DLB by selecting Diagnostics > Open Graph Data in the menu bar. A window will open prompting you to select the file to be viewed.

## CLOSING THE DIAMOND LOGIC® BUILDER PROGRAM

Follow these steps to close the Diamond Logic® Builder program:

1. If connected to a vehicle, disconnect the link by clicking the Communications Link icon in the toolbar.



**Figure 248 Communications Link Icon — Connected**

The image for this icon on the toolbar should now show a disconnected state. A similar icon will appear in the lower right corner of the window.



**Figure 249 Communications Link Icon — Disconnected**

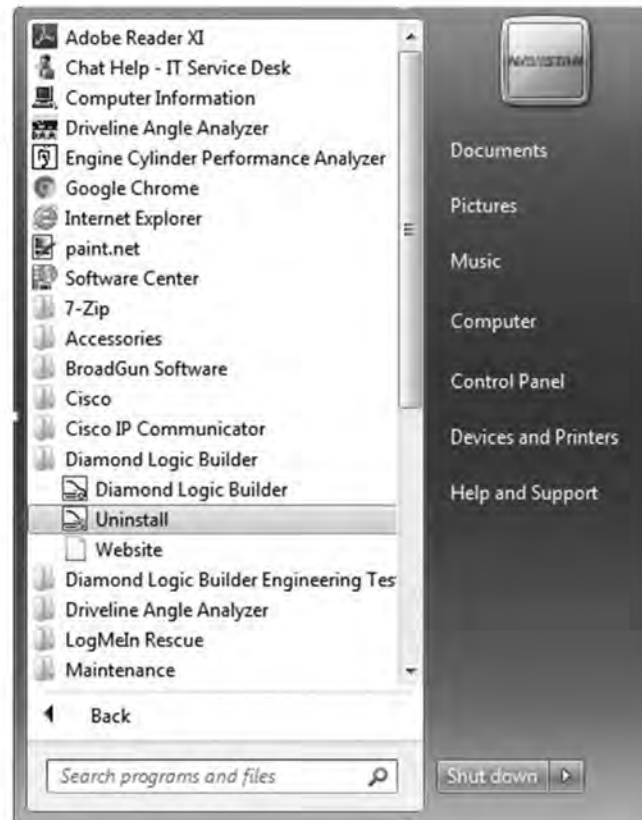
2. Close the DLB program window. There are two ways to do this:
  - Click the Close button (X) in the upper-right corner of the window.
  - In the menu bar, select File > Close.

Either option will end the session.

### UNINSTALLING THE DIAMOND LOGIC® BUILDER SOFTWARE

Follow these steps to remove the DLB software from a computer:

1. If the product key used for DLB on this computer will be used to install DLB on another computer, unregister this computer by selecting Help > Registration > Unregister this Machine in the menu bar. This releases the key for use on another computer.
2. In the Windows Start menu, select All Programs > Diamond Logic Builder > Uninstall.



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**Figure 250 DLB Uninstall in Windows Start Menu**

If Uninstall does not appear in the Start menu, use the Add or Remove Programs option in the Windows operating system to remove Diamond Logic® Builder.

DLB SUPPORT FOR CF 500, CF 600 AND CITYSTAR® TRUCKS

DLB can be used to set the Odometer Value within the cluster and can drive the J1939 driven gauges (Speedometer, Tachometer, and Coolant Temperature Gauge). It cannot turn on warning lights or indicators, nor can it exercise the fuel gauge.

Connect the interface cable to the diagnostic connector. A connection status bar should start to scroll across the bottom of the DLB display.

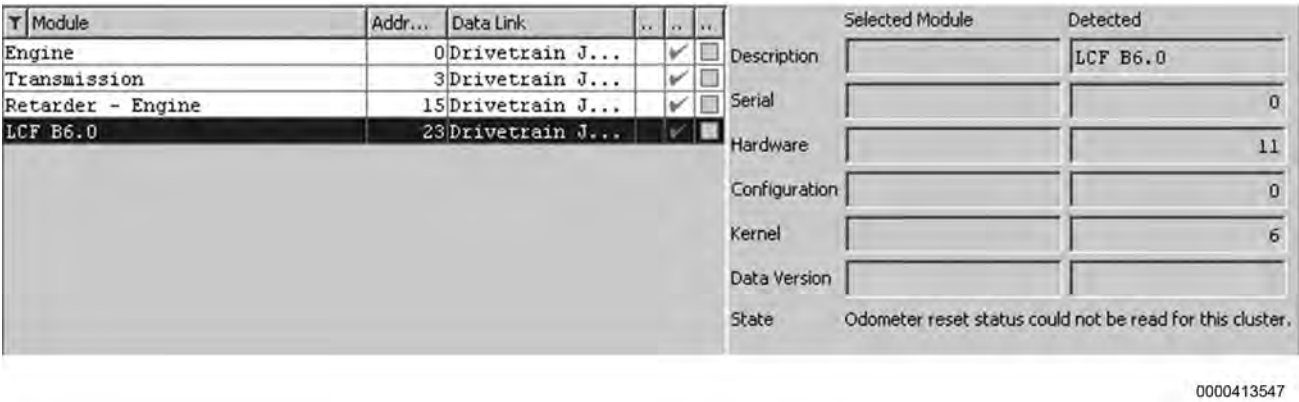


Figure 251 Select Tab (Lower Portion)

After the vehicle information has been downloaded, select LCF in the list to display LCF information on the lower right portion of the Select tab.

## TESTING GAUGES

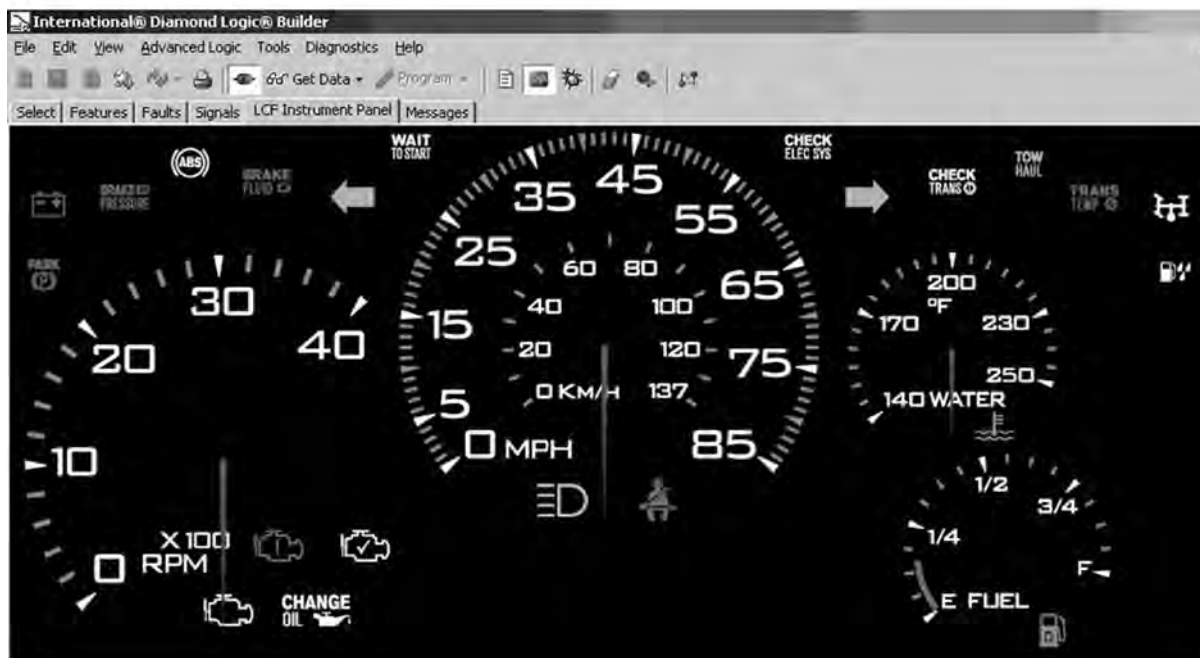
To test the gauges:

1. Click the Diagnostic Mode icon.



**Figure 252 Diagnostic Mode Icon**

2. Select the LCF Instrument Panel tab. The LCF cluster will be displayed.



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**Figure 253 LCF Instrument Panel Tab**

3. Gauges with RED dial indicators can be tested by clicking and dragging the indicator.

## DLB SUPPORT FOR THE VEHICLE INFORMATION DISPLAY (VID)

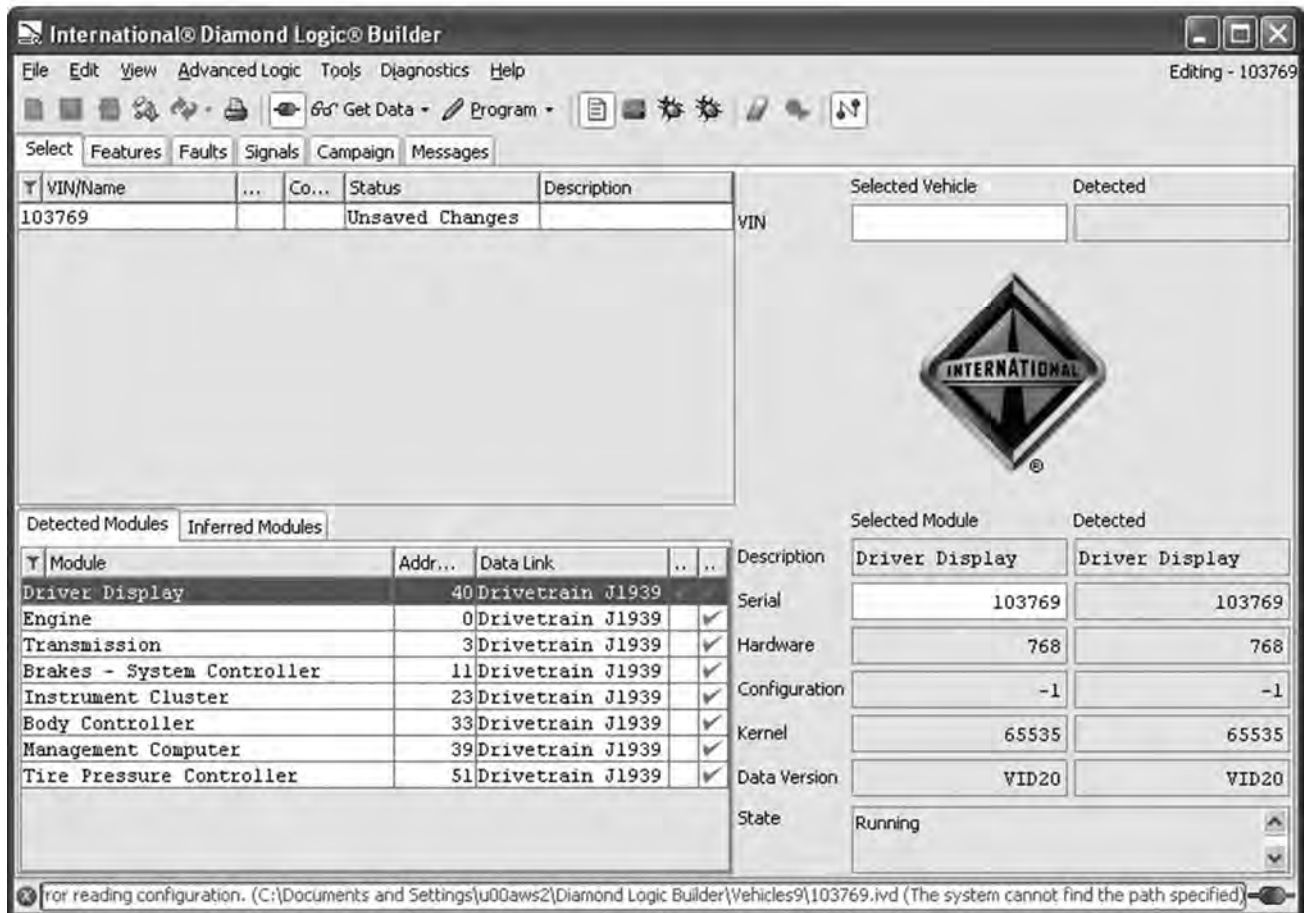
The DLB software must be used to program parameters that are not available on the VID on-screen menus. Other parameters can also be configured with DLB.

### Module Selection

Connect DLB to the vehicle as you normally would. Driver Display should be listed in the Module field under the Detected Modules tab.

**NOTE – You may need to pull fuses to prevent other components from communicating on the data link so DLB will connect to the VID successfully.**

On the Select tab, select the Driver Display serial number under Detected Modules.



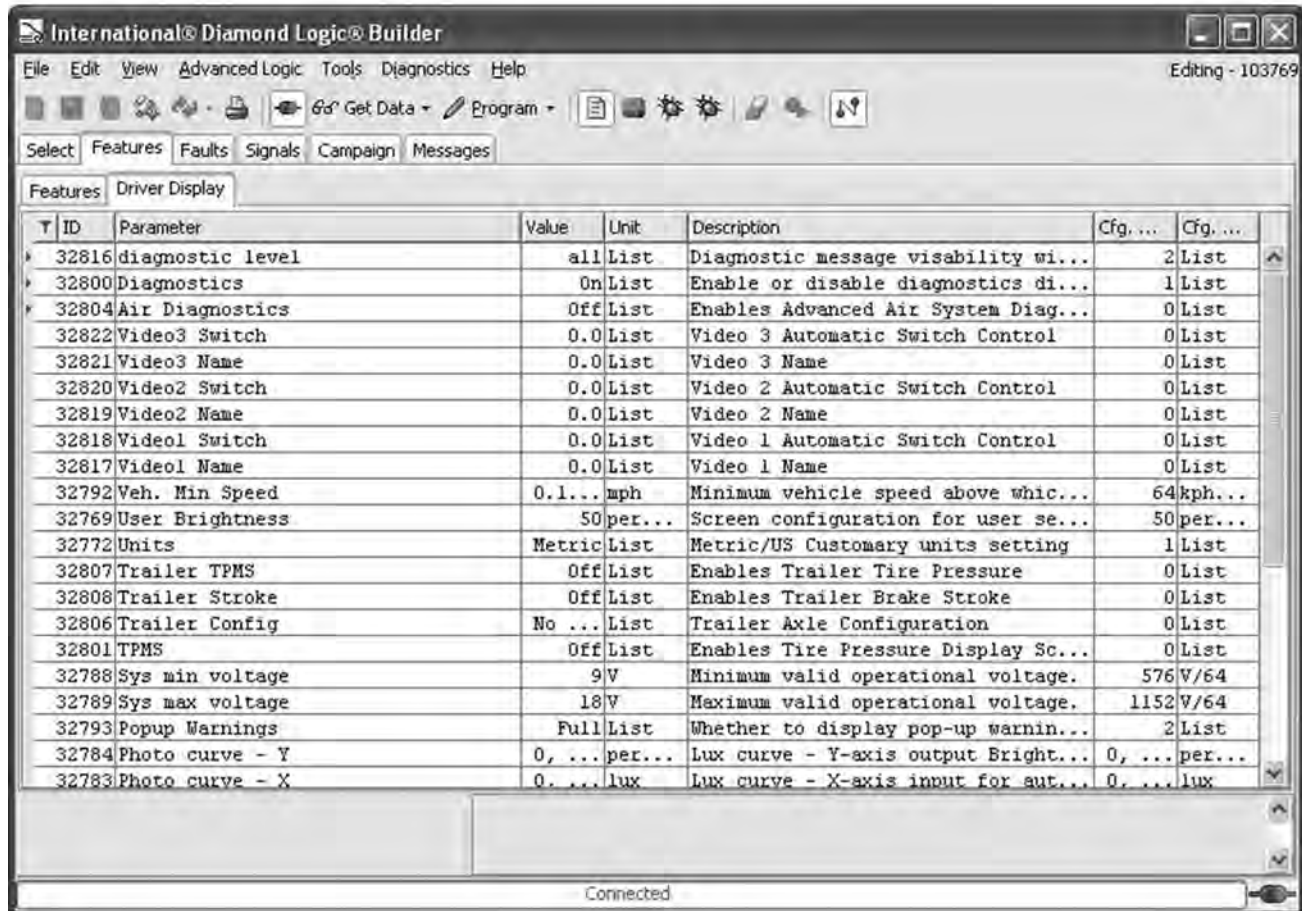
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**Figure 254 Select Tab with Driver Display Serial Number Selected**

## DLB SUPPORT FOR THE VEHICLE INFORMATION DISPLAY (VID)

### Features

The Driver Display tab can be viewed only when a Driver Display or a VID Template is selected.



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Figure 255 Driver Display Sub-Tab

### Programming

Select the parameter and change it as desired. Use the Program Module option to program the VID only.



## DOS AND DON'TS

### Do

- Test all designs thoroughly before selling equipment controlled by Diamond Logic® Builder programming. Exercise inputs and outputs under ALL possible combinations and conditions. Someone in addition to the advanced logic writer should test the design on the vehicle with the equipment that is to be controlled with the Diamond Logic® Builder software.

### Don't

- Do not try to program a vehicle with the ignition key OFF. Ensure the dome lights or park lights are on and the battery voltage is between 12.5 and 14 volts. Connect to a charger if necessary.

### Information

- The user ID is attached to each VIN configuration file when the user programs a vehicle. Adding / deleting features or changing programmable parameters is the user's responsibility. Navistar, Inc. shall not be liable for any consequential warranty or equipment damage resulting from the users programming efforts.
- Diagnostic fault codes will be viewable on the Faults tab only while the ignition key is in the Run position. The engine does not need to be running to view the ESC / BC codes.
- Diamond Logic® Builder will show fault codes from most modules communicating on the J1939 (CAN) Data Link. Diagnostic programs provided by the power train component suppliers can still be used to diagnose their systems.
- When diagnosing the gauge cluster with Diamond Logic® Builder, the pointers may not be stable. The pointers may be steered to zero intermittently. This is normal. Do not replace the gauge cluster due to this anomaly. It is important that the user can steer the gauge to a nominal value and that the pointer does not stick or jump in the process.

## ACRONYMS

ABS – Antilock brake system

AMP – Ampere

ATC – Automatic Traction Control

BCM – Body Control Module (Replaces ESC in most 2007+ vehicles)

BOC – Back of Cab

DLB – Diamond Logic® Builder

EGC – Electronic Gauge Cluster

ELAM – Electronic Lift Axle Module

ESC – Electronic System Controller

FET – Field Effect Transistor

FR – Front

GA – Gauge

GND – Ground

HVAC – Heating, Ventilation and Air Conditioning

HYD – Hydraulic

I/O – Input / Output

IGN – Ignition

MSVA – Modular Solenoid Valve Assembly (also known as RATM in other areas)

OnCommand® Service Information– Trademark for Navistar's website that provides service and diagnostics information.

PDC – Power Distribution Center

RAM – Random Access Memory

RASM – Remote Air Solenoid Module

ROF – Rear of Frame

RPM – Remote Power Module

RR – Rear

SW – Switch

TPMS – Tire Pressure Monitoring System

VIN – Vehicle Identification Number

VSS – Vehicle Speed Sensor

## CONTACT INFORMATION

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### CONTACT INFORMATION

Navistar, Inc. maintains a customer service technical support line for assistance with Advanced Logic and programming issues. Please use the following number to contact the Navistar Product Support Center:

1-800-336-4500 option 3 then option 5