



# Professional Diagnostics

## User Guide for Data Management, Component Replacement, Active Control, and Data Logging

Yanmar SmartAssist - Direct v2.xx



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Revision 1.0



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## Introduction





















### Purpose of this User's Guide

This user guide is intended to provide instructions for using Yanmar's SmartAssist - Direct Diagnostic Software. This software is intended to assist with troubleshooting electrical issues and updating engine control unit (ECU) software on Yanmar TNV Tier 4 engines.

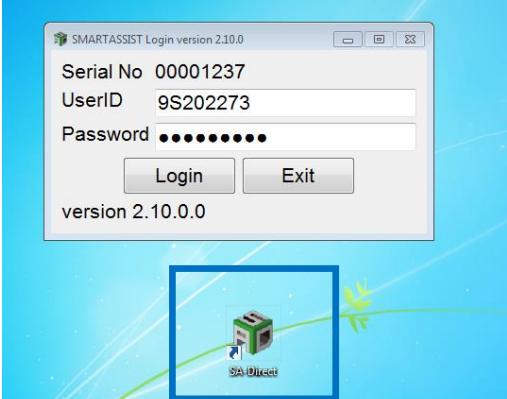
It is intended to help understand how data can be updated in the ECU, as well as saving ECU data and logging files for use in troubleshooting.

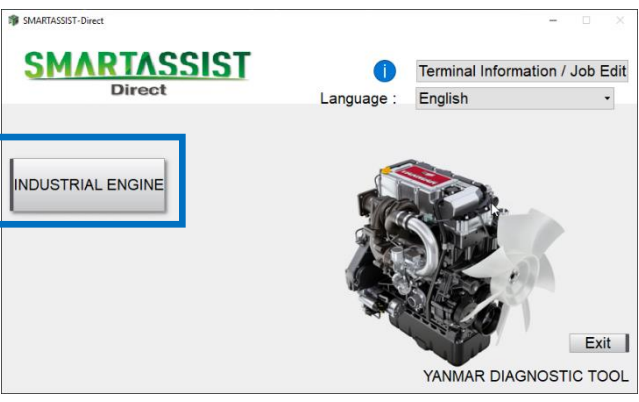
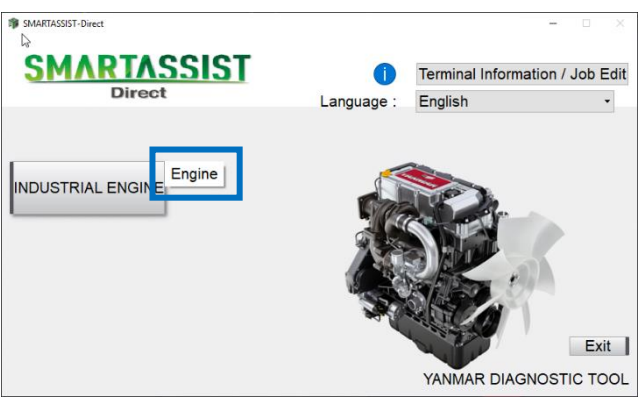
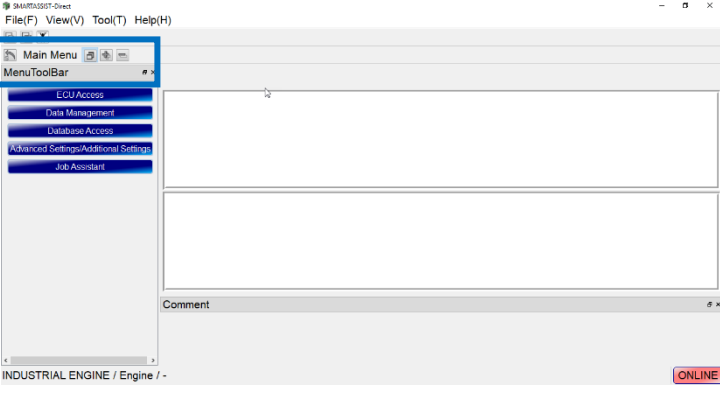
The information contained in this guide is supplementary and is not intended to be a replacement for other source material. To ensure information is current, relevant, and accurate, always refer to the latest product/serial number-specific service manual, service bulletins, operator manual, and/or parts books when necessary.

## SmartAssist Tool Bar Buttons

	ECU Data Save		Screen Print (Ctrl+P)		Screen BMP Save
	File Save (Ctrl+S)		Meas Data Save		Refresh
	Auto Refresh		Start		Stop
	Option Set		Trigger Set		Sample Rate Set
	Data Set		Graph Top Set		Graph Bottom Set
	Parameter Set		Filter Set		Connect
	Disconnect		Return Start Menu		

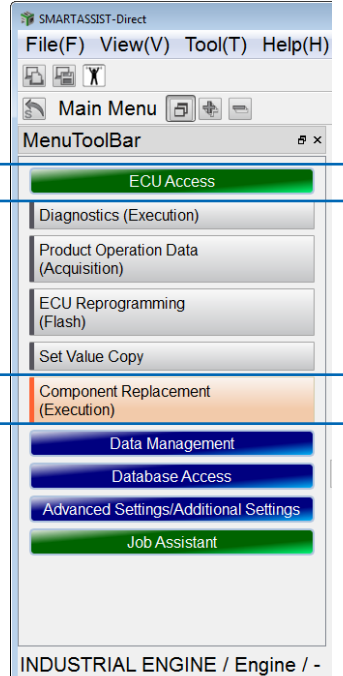
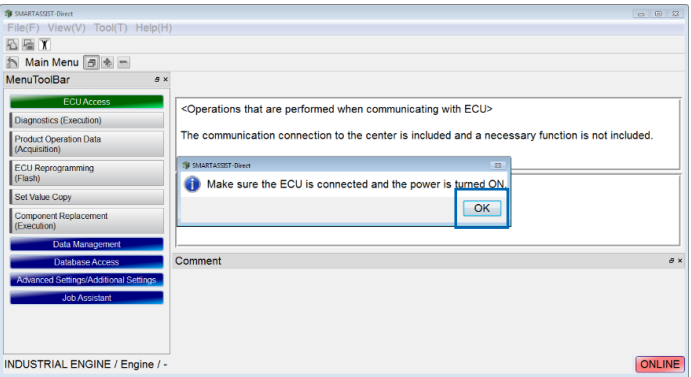
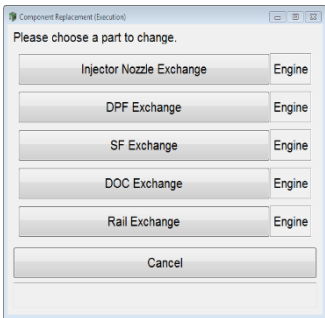
## Accessing the Main Menu

<ol style="list-style-type: none"> <li>1. Connect the SmartAssist cable between the ECU and your computer.</li> </ol>	
<ol style="list-style-type: none"> <li>2. Double-click the <b>SA-Direct</b> icon to start the program.             <ol style="list-style-type: none"> <li>a. Enter your <b>UserID</b> (if required) and password.</li> <li>b. Click <b>Login</b>.</li> </ol> </li> </ol>	

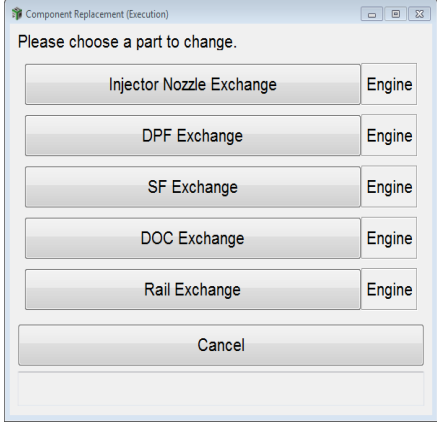
<p>3. Click <b>Industrial Engine</b>.</p>	 <p>The screenshot shows the SMARTASSIST Direct interface. At the top, it says 'SMARTASSIST Direct' and 'Terminal Information / Job Edit'. The language is set to 'English'. A large button labeled 'INDUSTRIAL ENGINE' is highlighted with a blue box. To the right is a 3D model of an engine. At the bottom right, there is an 'Exit' button and the text 'YANMAR DIAGNOSTIC TOOL'.</p>
<p>4. Click <b>Engine</b>.</p>	 <p>The screenshot shows the SMARTASSIST Direct interface. The 'INDUSTRIAL ENGINE' button is now greyed out, and a new button labeled 'Engine' is highlighted with a blue box. The rest of the interface, including the 3D engine model and 'Exit' button, remains the same.</p>
<p>5. You are now at the <b>Main Menu</b> and can access the <b>MenuToolBar</b>.</p>	 <p>The screenshot shows the SMARTASSIST Direct Main Menu. The 'MenuToolBar' is open, displaying a list of options: 'ECU Access', 'Data Management', 'Database Access', 'Advanced Settings/Additional Settings', and 'Job Assistant'. The 'Main Menu' and 'MenuToolBar' buttons are highlighted with blue boxes. The status bar at the bottom shows 'INDUSTRIAL ENGINE / Engine / -' and an 'ONLINE' indicator.</p>

## Component Replacement (Execution)

Whenever a fuel injector, soot filter (SF), diesel oxidation catalyst (DOC), diesel particulate filter (DPF) assembly, or a fuel pressure relief valve are replaced, the ECU must be updated. All of these are EPA-regulated devices and it is important that these replacement parts are recorded in the ECU and documented in the master engine file on the Yanmar server.

<ol style="list-style-type: none"> <li>1. Turn the machine key switch to the ON position.</li> <li>2. On the MenuToolBar, click <b>ECU Access</b>.</li> <li>3. Click <b>Component Replacement (Execution)</b>.</li> </ol>	
<ol style="list-style-type: none"> <li>4. Verify that the key switch is in the ON position, then click <b>OK</b>.</li> </ol>	
<ol style="list-style-type: none"> <li>5. The <b>Component Replacement (Execution)</b> window appears.</li> </ol>	

On the **Component Replacement (Execution)** window, there are five options to choose from. The following is a brief description of the details related to these options. When you click an option, that button will highlight blue.

Option	Description	
Injector Nozzle Exchange	Trim data from the replacement injector must be updated to the ECU and the Yanmar server.	
DPF Exchange	When replacing the DPF assembly, the diesel oxidation catalyst and the soot filter values must be updated in the ECU.	
SF Exchange	Update the ECU when replacing or cleaning the soot filter.	
DOC Exchange	Update the ECU when replacing the diesel oxidation catalyst.	
Rail Exchange	Use to reset the fuel pressure relief counter.	

The following pages provide step-by-step instructions for each option in the **Component Replacement (Execution)** window.

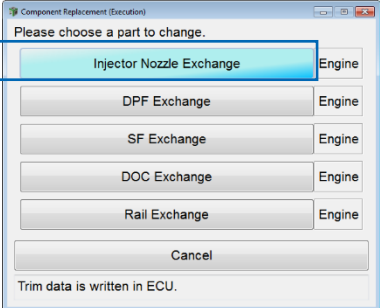
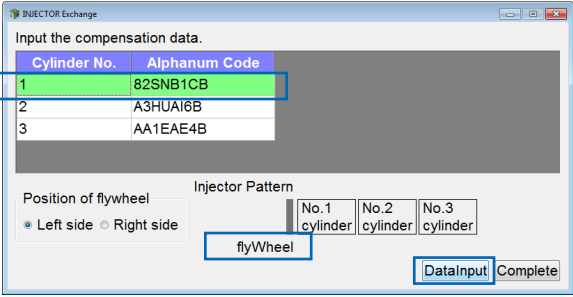

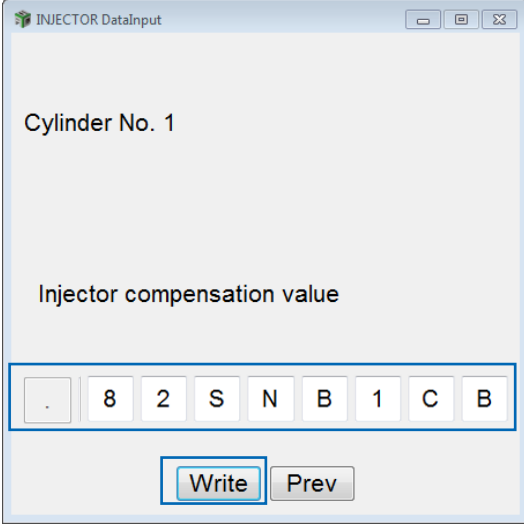
Prior to using any of these options, make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

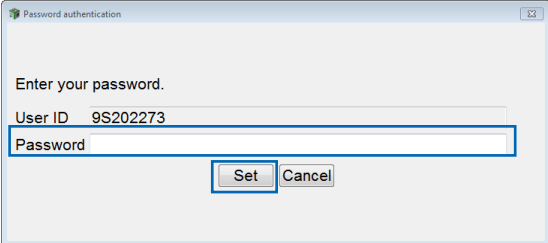
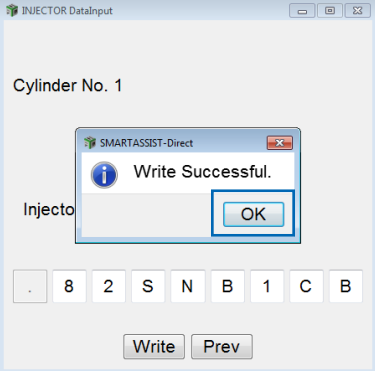
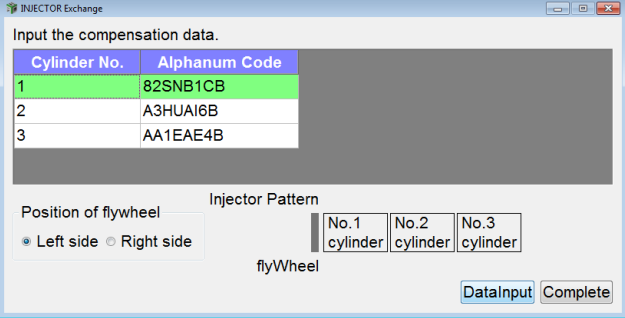
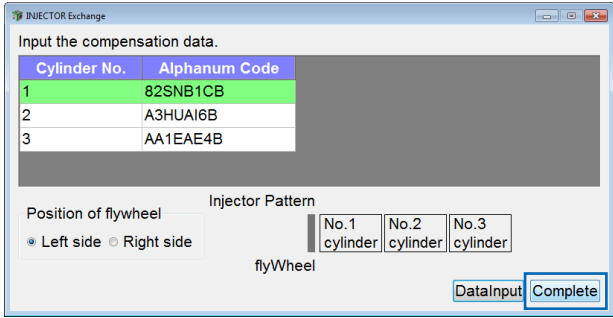


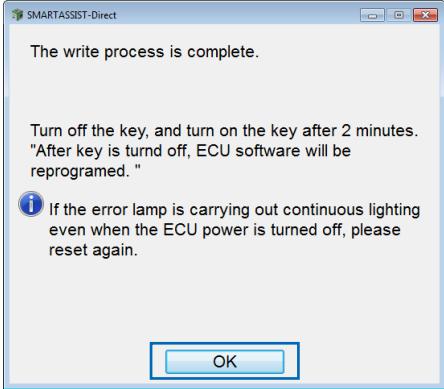
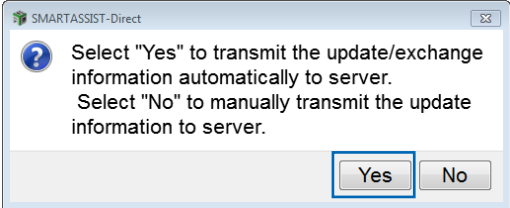
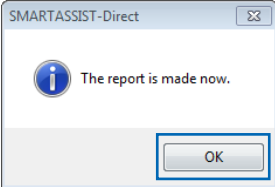
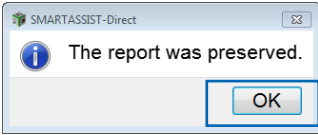
## Injector Nozzle Exchange

Whenever a fuel injector is replaced, the injector trim data of the new injector must be updated in the ECU. This trim data ensures that the injector is delivering the correct amount of fuel.

**Note:** Make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

<p>1. Click <b>Injector Nozzle Exchange</b> (the button will highlight blue).</p>	
<p>2. On the <b>INJECTOR Exchange</b> window, the current fuel injector trim data is displayed:</p> <ol style="list-style-type: none"> <li>In the table, click the cylinder number where the injector will be replaced (the line will be highlighted green when clicked).</li> </ol> <p><b>Note:</b> Yanmar numbers their cylinder locations starting at the flywheel.</p> <ol style="list-style-type: none"> <li>Click <b>DataInput</b>.</li> </ol>	
<p>3. On the <b>INJECTOR DataInput</b> window:</p> <ol style="list-style-type: none"> <li>Enter the trim data (must use capital letters) from the new injector.</li> </ol> <p><b>Note:</b> The trim data number is listed on top of the injector, opposite the electrical connector.</p>  <ol style="list-style-type: none"> <li>Click <b>Write</b>.</li> </ol>	

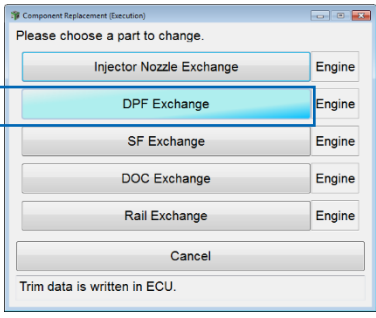
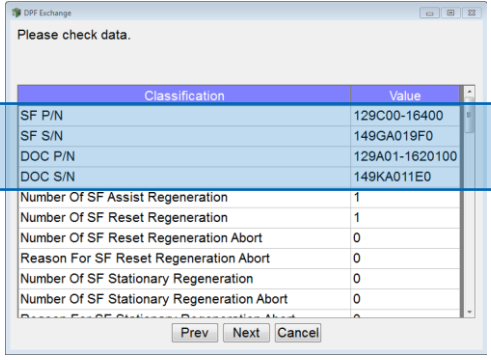
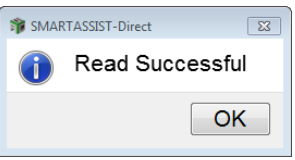
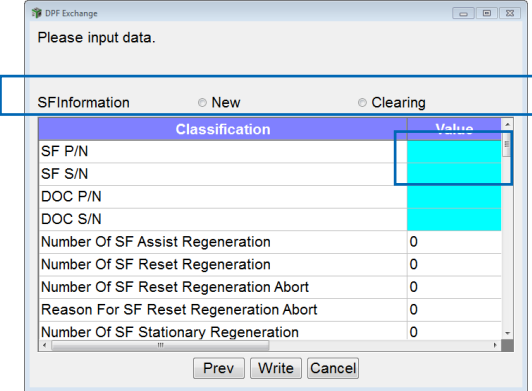
<p>4. On the <b>Password authentication</b> window:</p> <ol style="list-style-type: none"> <li>Enter your SmartAssist password.</li> <li>Click <b>Set</b>.</li> </ol>	 <p>The screenshot shows a 'Password authentication' dialog box. It contains the text 'Enter your password.' Below this, there are two input fields: 'User ID' with the value '9S202273' and 'Password'. At the bottom of the dialog, there are two buttons: 'Set' and 'Cancel'. The 'Set' button is highlighted with a blue border.</p>								
<p>5. The "Write Successful" message appears to let you know the trim data was successfully saved.</p> <ol style="list-style-type: none"> <li>Click <b>OK</b>.</li> </ol>	 <p>The screenshot shows the 'INJECTOR DataInput' window. At the top, it says 'Cylinder No. 1'. Below this, there is a smaller 'SMARTASSIST-Direct' dialog box with a blue information icon and the text 'Write Successful.' and an 'OK' button. The 'OK' button is highlighted with a blue border. Below the dialog box, there are several buttons: 'Injecto', 'Write', and 'Prev'. At the bottom, there is a row of buttons with the characters '8 2 S N B 1 C B'.</p>								
<p>6. Repeat steps 2–5 for all injectors that are being replaced.</p> <p><b>Note:</b> Remember that the No.1 cylinder is located next to the flywheel.</p>	 <p>The screenshot shows the 'INJECTOR Exchange' window. It has a title bar and a close button. The main content area is titled 'Input the compensation data.' and contains a table with the following data:</p> <table border="1"> <thead> <tr> <th>Cylinder No.</th> <th>Alphanum Code</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>82SNB1CB</td> </tr> <tr> <td>2</td> <td>A3HUA16B</td> </tr> <tr> <td>3</td> <td>AA1EAE4B</td> </tr> </tbody> </table> <p>Below the table, there are two sections: 'Position of flywheel' with radio buttons for 'Left side' (selected) and 'Right side'; and 'Injector Pattern' with three buttons labeled 'No.1 cylinder', 'No.2 cylinder', and 'No.3 cylinder'. At the bottom right, there are two buttons: 'DataInput' and 'Complete'.</p>	Cylinder No.	Alphanum Code	1	82SNB1CB	2	A3HUA16B	3	AA1EAE4B
Cylinder No.	Alphanum Code								
1	82SNB1CB								
2	A3HUA16B								
3	AA1EAE4B								
<p>7. When you are finished updating all of the injector trim data:</p> <ol style="list-style-type: none"> <li>Click <b>Complete</b>.</li> </ol>	 <p>This screenshot is identical to the previous one, but the 'Complete' button at the bottom right is highlighted with a blue border.</p>								

<p>8. “The write process is complete.” message appears with instructions.</p> <ol style="list-style-type: none"> <li>Turn the key switch to OFF and wait at least 2 minutes. This will write the new data to the ECU.</li> <li>After 2 minutes, turn the key switch to ON.</li> <li>Click <b>OK</b>.</li> </ol>	
<p>9. On this SMARTASSIST-Direct window, click <b>Yes</b>.</p> <p><b>Note:</b> By clicking <b>Yes</b>, the new trim data information will automatically be sent to the Yanmar Japan server, so it can update the master machine file. This will be done the next time you open SmartAssist while an active Internet connection exists.</p>	
<p>10. “The report is made now.” message appears</p> <ol style="list-style-type: none"> <li>Click <b>OK</b>.</li> </ol>	
<p>11. “The report was preserved.” message appears. This means that your report is now saved:</p> <ol style="list-style-type: none"> <li>Click <b>OK</b>.</li> </ol>	
<p>The Injector Trim Data updating is now complete.</p>	

## DPF Exchange

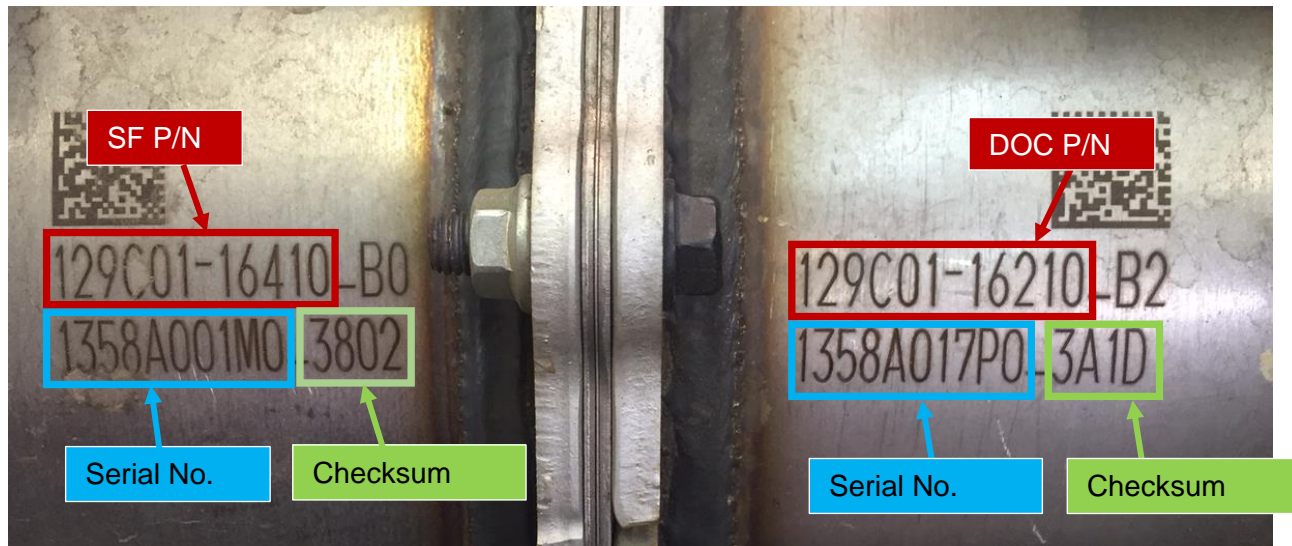
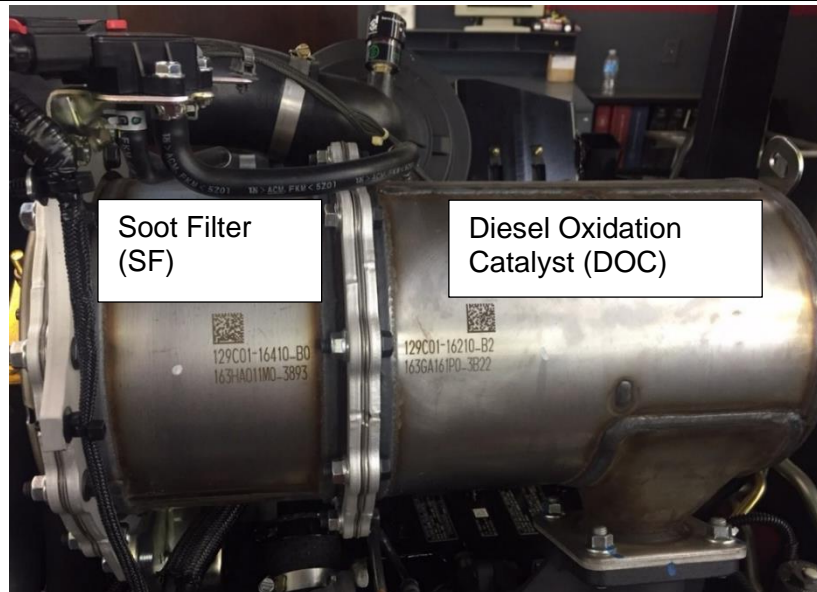
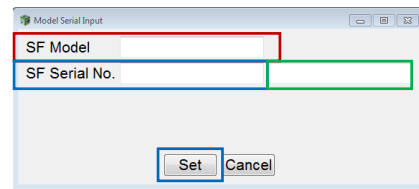
If the complete DPF assembly needs to be replaced, the part number and serial number of the soot filter (SF) section and the diesel oxidation catalyst (DOC) section of the DPF assembly will need to be updated in the ECU using this process.

**Note:** Make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

<p>1. Click <b>DPF Exchange</b> (the button will highlight blue).</p>	
<p>2. On the <b>DPF Exchange</b> window, the current SF and DOC part and serial numbers are displayed: a. Click <b>Next</b>.</p>	
<p>3. Click <b>OK</b>.</p>	
<p>4. On the <b>DPF Exchange</b> window: a. Click the appropriate <b>SFInformation</b> option button: i. If the DPF is new, click <b>New</b>. ii. If the DPF has been cleaned, click <b>Clearing</b>. b. Click in an SF row in the blue highlighted area under the <b>Value</b> column.</p>	

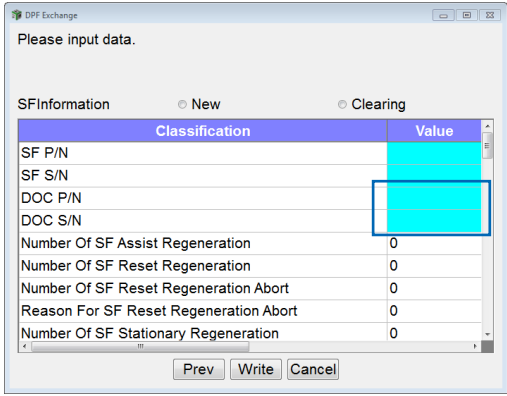
5. On the **Model Serial Input** window, enter the following:
  - a. SF **model number**.
  - b. SF **serial number**.
  - c. **Checksum**.
  - d. Click **Set** when all values have been entered.

**Note:** See images below to learn where these values are located on the DPF assembly. Notice that the last two characters of the soot filter model number are NOT used.



6. On the **DPF Exchange** window:

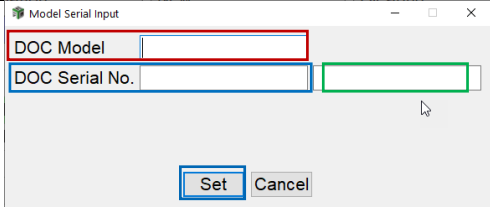
- Click in a DOC row in the blue highlighted area under the **Value** column:



7. On the **Model Serial Input** window, enter the following:

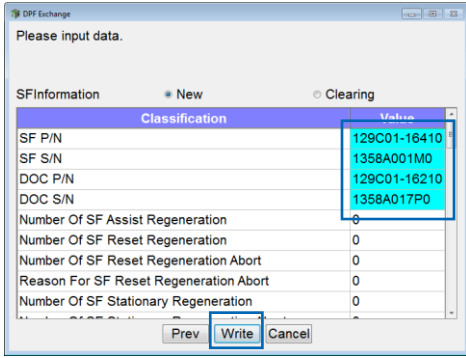
- DOC **model number**.
- DOC **serial number**.
- Checksum**.
- Click **Set** when all values have been entered.

**Note:** See images for step 5 to learn where these values are located on the DPF assembly. Notice that the last two characters of the Diesel Oxidation Catalyst model number are NOT used.



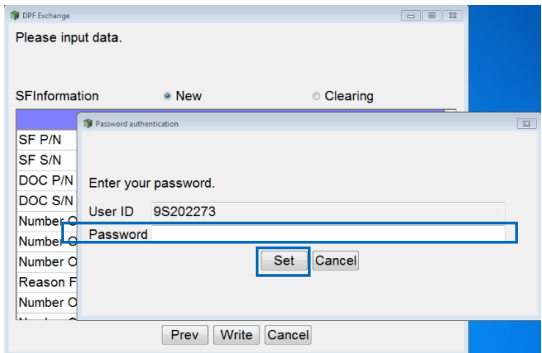
8. Once the new SF and DOC part and serial numbers are updated in the ECU:

- Click **Write**.



9. On the **Password authentication** window:

- Enter your SmartAssist password.
- Click **Set**.

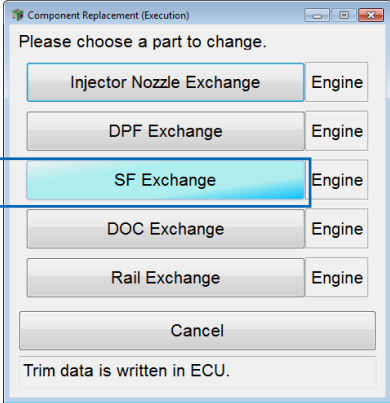
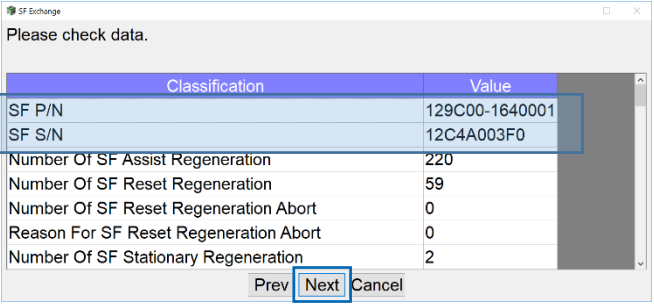
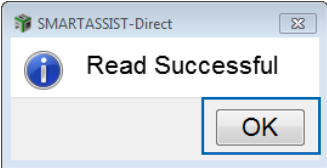
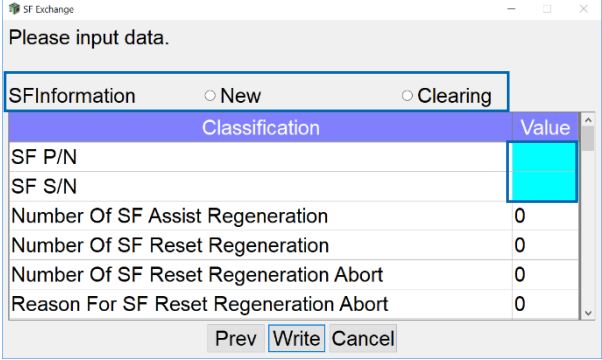


The DPF Exchange update is now complete.

## SF Exchange

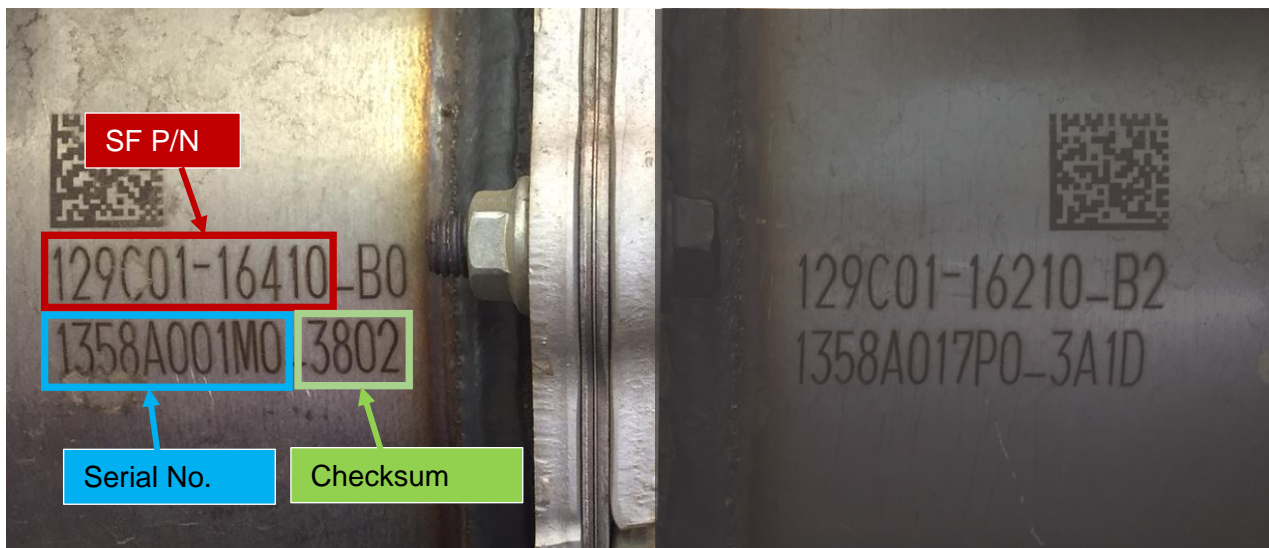
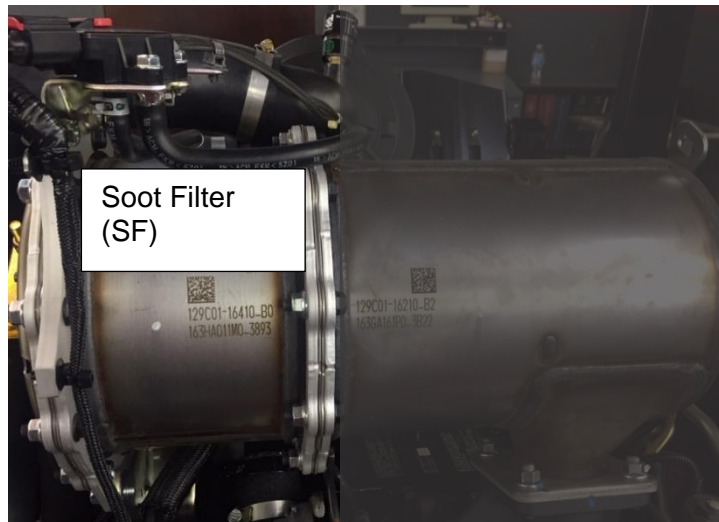
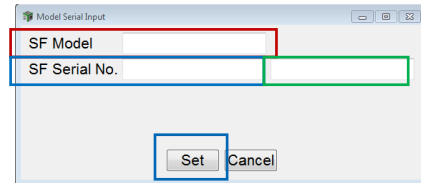
When the soot filter (SF) section of the DPF needs to be removed for cleaning or replacement with a new soot filter, the part number and serial number of soot filter assembly will need to be updated in the ECU using this process.

**Note:** Make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

<p>1. Click <b>SF Exchange</b> (button will highlight blue).</p>																	
<p>2. The current SF part and serial numbers will be displayed:</p> <p>a. Click <b>Next</b>.</p>	 <table border="1" data-bbox="805 1045 1455 1249"> <thead> <tr> <th>Classification</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>SF P/N</td> <td>129C00-1640001</td> </tr> <tr> <td>SF S/N</td> <td>12C4A003F0</td> </tr> <tr> <td>Number Of SF Assist Regeneration</td> <td>220</td> </tr> <tr> <td>Number Of SF Reset Regeneration</td> <td>59</td> </tr> <tr> <td>Number Of SF Reset Regeneration Abort</td> <td>0</td> </tr> <tr> <td>Reason For SF Reset Regeneration Abort</td> <td>0</td> </tr> <tr> <td>Number Of SF Stationary Regeneration</td> <td>2</td> </tr> </tbody> </table>	Classification	Value	SF P/N	129C00-1640001	SF S/N	12C4A003F0	Number Of SF Assist Regeneration	220	Number Of SF Reset Regeneration	59	Number Of SF Reset Regeneration Abort	0	Reason For SF Reset Regeneration Abort	0	Number Of SF Stationary Regeneration	2
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<p>3. Click <b>OK</b>.</p>																	
<p>4. On the SF Exchange window:</p> <p>a. Click the appropriate <b>SFInformation</b> option button:</p> <ol style="list-style-type: none"> <li>If the SF is new, click <b>New</b>.</li> <li>If the SF has been cleaned, click <b>Clearing</b>.</li> </ol> <p>b. Click in an SF row in the blue highlighted area under the <b>Value</b> column.</p>	 <table border="1" data-bbox="857 1581 1455 1833"> <thead> <tr> <th>Classification</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>SF P/N</td> <td></td> </tr> <tr> <td>SF S/N</td> <td></td> </tr> <tr> <td>Number Of SF Assist Regeneration</td> <td>0</td> </tr> <tr> <td>Number Of SF Reset Regeneration</td> <td>0</td> </tr> <tr> <td>Number Of SF Reset Regeneration Abort</td> <td>0</td> </tr> <tr> <td>Reason For SF Reset Regeneration Abort</td> <td>0</td> </tr> </tbody> </table>	Classification	Value	SF P/N		SF S/N		Number Of SF Assist Regeneration	0	Number Of SF Reset Regeneration	0	Number Of SF Reset Regeneration Abort	0	Reason For SF Reset Regeneration Abort	0		
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Reason For SF Reset Regeneration Abort	0																

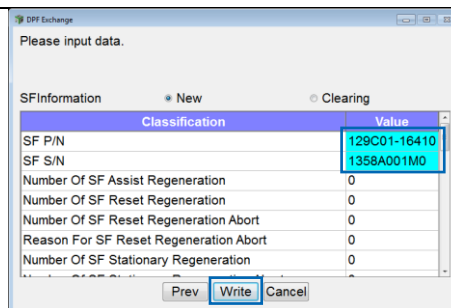
5. On the **Model Serial Input** window, enter the following:
  - a. SF **model number**.
  - b. SF **serial number**.
  - c. **Checksum**.
  - d. Click **Set** when all values have been entered.

**Note:** See images below to learn where these values are located on the DPF assembly. Notice that the last two characters of the soot filter model number are NOT used.

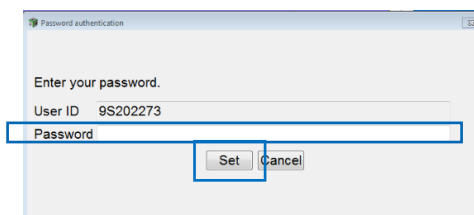




6. Once the new SF part and serial numbers are updated in the ECU:
  - a. Click **Write**.



7. On the **Password authentication** window:
  - a. Enter your SmartAssist password.
  - b. Click **Set**.

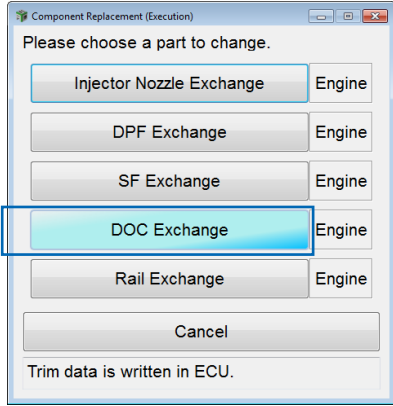
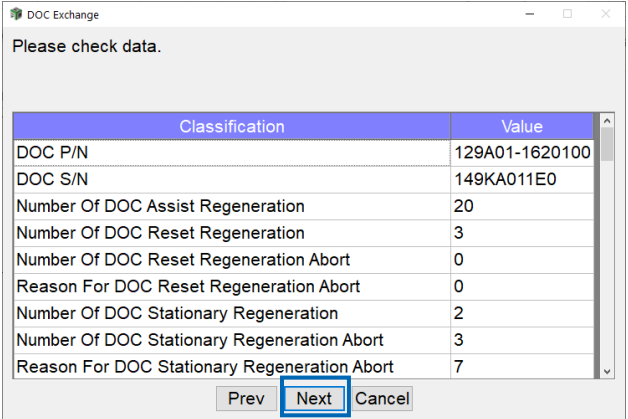
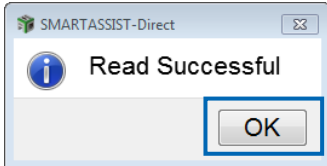


The SF Exchange updating is now complete.

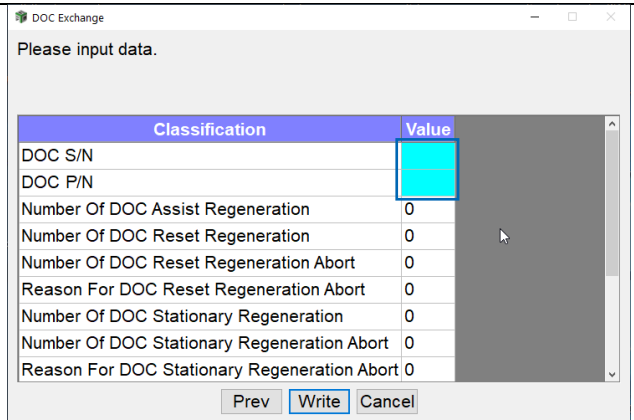
## DOC Exchange

If the diesel oxidation catalyst (DOC) section of the DPF needs to be replaced, the part number and serial number of DOC assembly need to be updated in the ECU using this process.

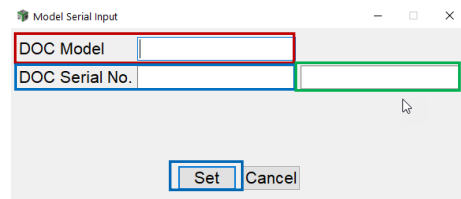
**Note:** Make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

<p>1. Click <b>DOC Exchange</b> (the button will highlight blue).</p>																					
<p>2. The current DOC part and serial numbers will be displayed: a. Click <b>Next</b>.</p>	 <table border="1" data-bbox="841 1062 1442 1329"> <thead> <tr> <th>Classification</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>DOC P/N</td> <td>129A01-1620100</td> </tr> <tr> <td>DOC S/N</td> <td>149KA011E0</td> </tr> <tr> <td>Number Of DOC Assist Regeneration</td> <td>20</td> </tr> <tr> <td>Number Of DOC Reset Regeneration</td> <td>3</td> </tr> <tr> <td>Number Of DOC Reset Regeneration Abort</td> <td>0</td> </tr> <tr> <td>Reason For DOC Reset Regeneration Abort</td> <td>0</td> </tr> <tr> <td>Number Of DOC Stationary Regeneration</td> <td>2</td> </tr> <tr> <td>Number Of DOC Stationary Regeneration Abort</td> <td>3</td> </tr> <tr> <td>Reason For DOC Stationary Regeneration Abort</td> <td>7</td> </tr> </tbody> </table>	Classification	Value	DOC P/N	129A01-1620100	DOC S/N	149KA011E0	Number Of DOC Assist Regeneration	20	Number Of DOC Reset Regeneration	3	Number Of DOC Reset Regeneration Abort	0	Reason For DOC Reset Regeneration Abort	0	Number Of DOC Stationary Regeneration	2	Number Of DOC Stationary Regeneration Abort	3	Reason For DOC Stationary Regeneration Abort	7
Classification	Value																				
DOC P/N	129A01-1620100																				
DOC S/N	149KA011E0																				
Number Of DOC Assist Regeneration	20																				
Number Of DOC Reset Regeneration	3																				
Number Of DOC Reset Regeneration Abort	0																				
Reason For DOC Reset Regeneration Abort	0																				
Number Of DOC Stationary Regeneration	2																				
Number Of DOC Stationary Regeneration Abort	3																				
Reason For DOC Stationary Regeneration Abort	7																				
<p>3. Click <b>OK</b>.</p>																					

4. On the DOC Exchange window:
  - a. Click in a DOC row in the blue highlighted area under the **Value** column.



5. On the **Model Serial Input** window, enter the following:
  - a. Doc **model number**.
  - b. Doc **serial number**.
  - c. **Checksum**.
  - d. Click **Set** when all values have been entered.

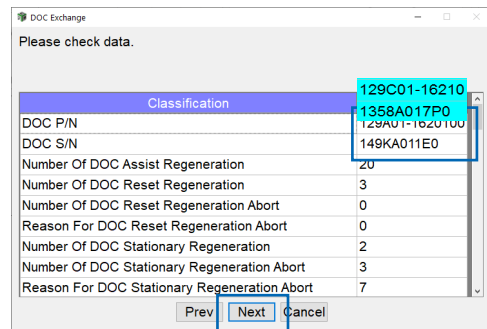


**Note:** See images below to learn where these values are located on the DPF assembly. Notice that the last two characters of the diesel oxidation catalyst model number are NOT used.

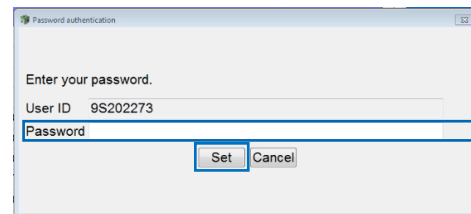




6. Once DOC part and serial numbers are updated in the ECU:
- a. Click **Write**.



7. On the **Password authentication** window:
- a. Enter your SmartAssist password.
  - b. Click **Set**.



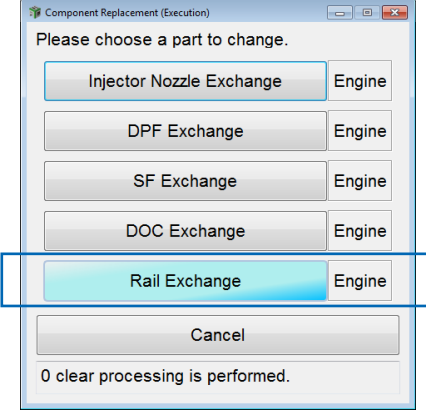
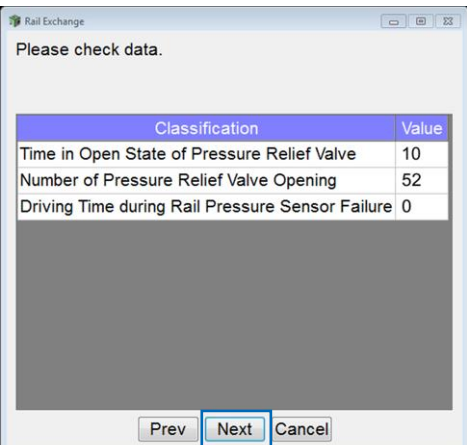
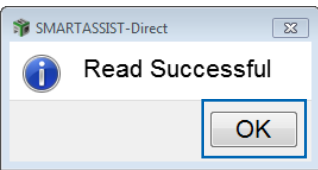
The DOC Exchange updating is now complete.

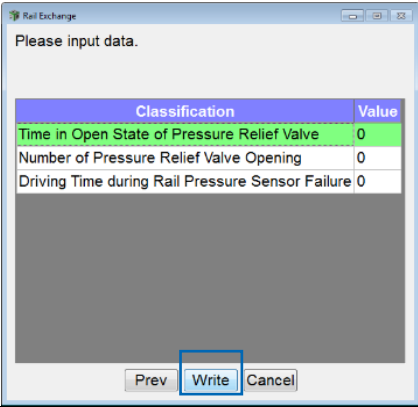
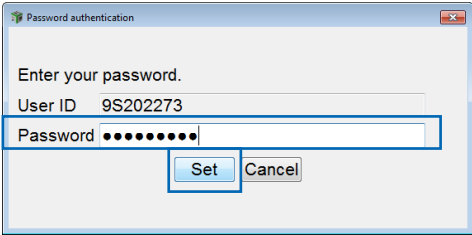
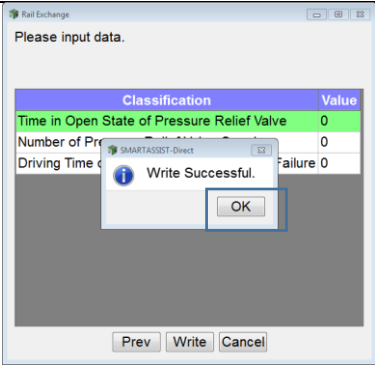
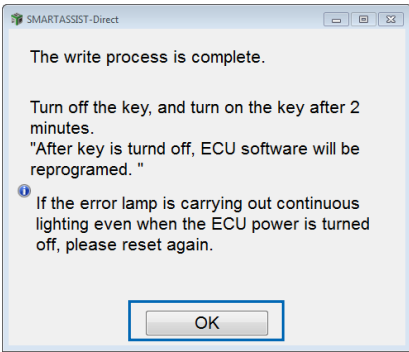
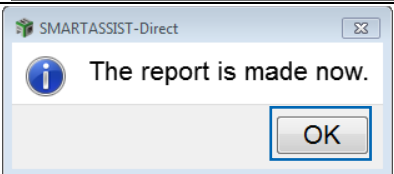
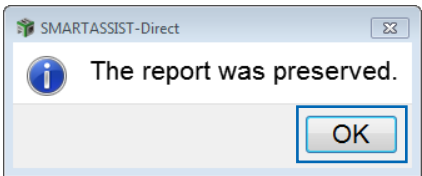
## Rail Exchange

When a fuel pressure relief valve or a fuel pressure sensor is replaced on the high-pressure common rail, the relief valve operation information needs to be updated in the ECU using this process. This will reset the three values back to 0.

**Note:** Fault code P1666 (Rail Pressure Fault (times of PLV opening error)) cannot be cleared until the Rail Exchange process has been completed.

**Note:** Make sure you connect SmartAssist to the ECU and navigate to the **Component Replacement (Execution)** window as described in the [Component Replacement \(Execution\)](#) section on page 5 of this guide.

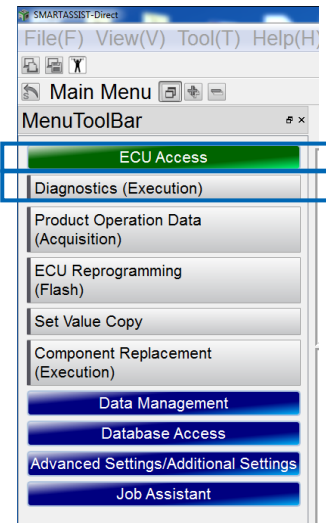
<p>1. Click <b>Rail Exchange</b> (the button will highlight blue).</p>									
<p>2. The <b>Rail Exchange</b> window will display statistics for the rail pressure relief operation:</p> <p>a. Click <b>Next</b>.</p>	 <table border="1" data-bbox="917 1218 1347 1323"> <thead> <tr> <th>Classification</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Time in Open State of Pressure Relief Valve</td> <td>10</td> </tr> <tr> <td>Number of Pressure Relief Valve Opening</td> <td>52</td> </tr> <tr> <td>Driving Time during Rail Pressure Sensor Failure</td> <td>0</td> </tr> </tbody> </table>	Classification	Value	Time in Open State of Pressure Relief Valve	10	Number of Pressure Relief Valve Opening	52	Driving Time during Rail Pressure Sensor Failure	0
Classification	Value								
Time in Open State of Pressure Relief Valve	10								
Number of Pressure Relief Valve Opening	52								
Driving Time during Rail Pressure Sensor Failure	0								
<p>3. SmartAssist will now clear the data:</p> <p>a. Click <b>OK</b>.</p>									

<p>4. The values reset to zero and are saved to the ECU.</p> <p>a. Click <b>Write</b>.</p>	
<p>5. Enter your SmartAssist password:</p> <p>a. Click <b>Set</b>.</p>	
<p>6. When update is successful:</p> <p>a. Click <b>OK</b>.</p>	
<p>7. Turn the key switch to OFF for at least 2 minutes, and then turn it back to ON:</p> <p>a. Click <b>OK</b>.</p>	
<p>8. The information is captured in the ECU:</p> <p>a. Click <b>OK</b>.</p>	
<p>9. The new information is now saved in the ECU:</p> <p>a. Click <b>OK</b>.</p>	

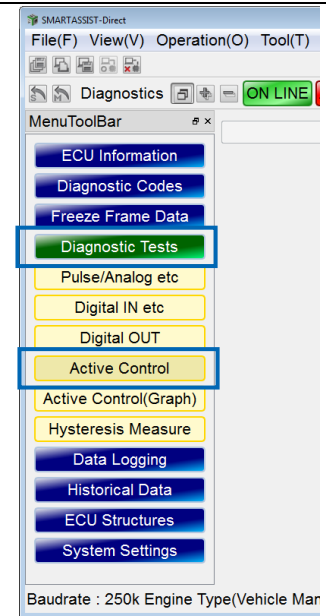
## Accessing the Diagnostics Menu

Beginning at the **Main Menu**, navigate to the **Diagnostics** menu as outlined in the steps below.

1. From the **Main Menu**:
  - a. Verify that the key switch is in the ON position.
  - b. Click **ECU Access**.
  - c. Click **Diagnostics (Execution)**.



2. From the **Diagnostics** menu:
  - a. Verify SmartAssist is connected and communicating with the ECU:
    - i. Click **Diagnostic Tests**.
    - ii. Click **Active Control**.



In the **Diagnostic Tests** menu, there are six options. In this section, the **Active Control** menu will be reviewed.

## Diagnostic Tests - Active Control

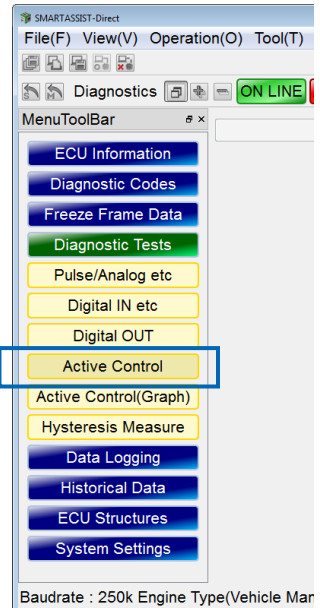
The **Active Control** menu allows bi-directional control of certain engine functions. The following activities can be performed from the **Active Control** menu:

1. Direct Engine RPM Control
2. Direct EGR Valve Control
3. Injector Test
4. Intake Throttle Position Control
5. Exhaust Throttle Position Control\*
6. DPF Active Regeneration

\*Important Note: Toro engines do not have an exhaust throttle valve, therefore the **Exhaust Throttle Position Control** option is not used.

1. Within **Diagnostic Tests**:

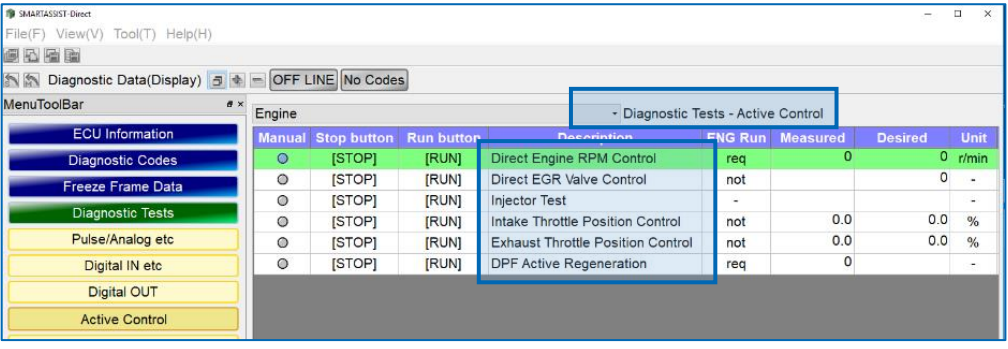
a. Click **Active Control**.



Baudrate : 250k Engine Type(Vehicle Mar

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2. On the **Diagnostic Tests – Active Control** screen, you can select the test you would like to perform.



Manual	Stop button	Run button	Description	ENG Run	Measured	Desired	Unit
<input type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	0	0	r/min
<input type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		0	-
<input type="radio"/>	[STOP]	[RUN]	Injector Test	-			-
<input type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not	0.0	0.0	%
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not	0.0	0.0	%
<input type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0		-



## Direct EGR Valve Control

The EGR valve is a normally-closed, and electrically-opened device that allows exhaust gas into the intake manifold to control combustion temperatures to reduce NOx. To determine if the EGR valve is functioning correctly, or to open the valve for inspection or cleaning, **Direct EGR Valve Control** will allow you to command the valve open and closed.

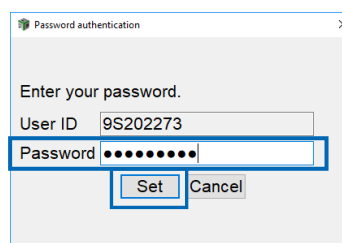
1. Remove the EGR valve from the engine, but leave the harness connected.

2. Click **RUN** to select **Direct EGR Valve Control** (highlighted green).

Manual	Stop button	Run button	Description	ENG Run	Measured	Desirec	Unit	Graph	ECU	CID
<input checked="" type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		0	-		Engine	63724
<input type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	0	0	r/min	<input type="radio"/>	Engine	63712
<input type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0	0	-	<input type="radio"/>	Engine	64220
<input type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not		0.0	%	<input type="radio"/>	Engine	64218
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not		0.0	%	<input type="radio"/>	Engine	64219
<input type="radio"/>	[STOP]	[RUN]	Injector Test	-		000	-		Engine	64480

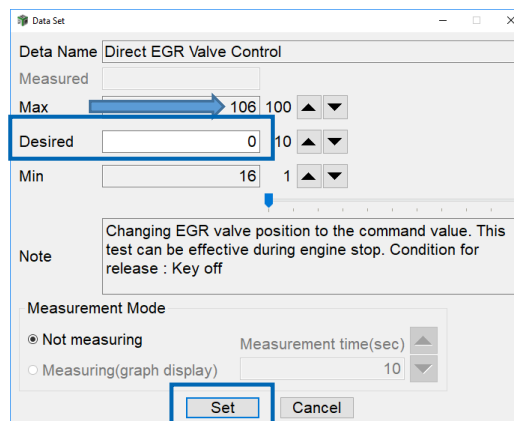
3. From the **Password authentication** window:

- a. Enter your password.
- b. Click **Set**.



4. On the **Data Set** window, in the **Desired** box:

- a. Enter the number shown in the **Max** box.
- b. Click **Set**.



5. Watch the EGR valve. It should now be open.

6. To close the EGR valve:

- a. Enter **0** into the Desired box.
- b. Click **Set**:
  - i. The EGR valve will close.  
(Turning the key switch to OFF will also close the EGR valve.)

## Direct Engine RPM Control

The engine RPM is controlled via a switch on the operator console. The switch is an input to the Toro TEC controller where it converts the RPM request into a CAN message that is broadcast to the Yanmar ECU to control engine RPM. When there is a problem with the engine RPM not responding, you must determine whether the issue is on the Toro side or the Yanmar side.

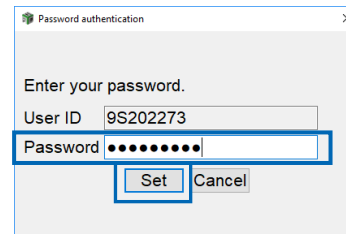
The **Direct Engine RPM Control** allows you command the engine to a given RPM.

1. Click **RUN** to select **Direct Engine RPM Control** (highlighted green).

Manual	Stop button	Run button	Description	ENG Run	Measured	Desired	Unit	Graph	ECU	CID
<input type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		0	-		Engine	63724
<input checked="" type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	0	0	r/min	<input checked="" type="radio"/>	Engine	63712
<input type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0	0	-		Engine	64220
<input type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not		0.0	%	<input checked="" type="radio"/>	Engine	64218
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not		0.0	%	<input checked="" type="radio"/>	Engine	64219
<input type="radio"/>	[STOP]	[RUN]	Injector Test	-		000	-		Engine	64480

2. On the **Password authentication** window:

- a. Enter your password.
- b. Click **Set**.

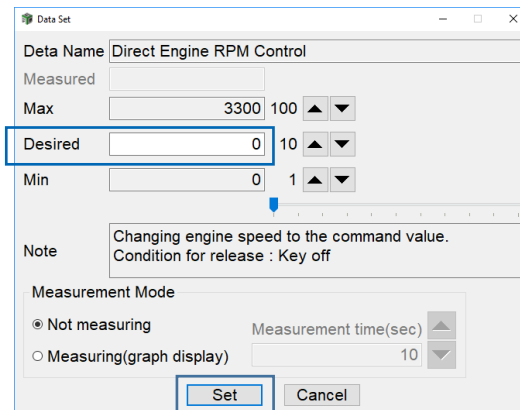


3. On the **Data Set** window, in the **Desired** box:

- a. Enter the RPM that you want the engine to run at.

**Note:** Entering a number lower than idle, engine will only return to idle speed. Entering a number higher than full throttle speed, engine will only run to its programmed high idle rpm.

- b. Click **Set**.



4. The engine RPM should start rising to the desired set point you entered. If the engine RPM does not rise, then there is an issue in the ECU.

## Injector Test

The Yanmar Tier 4 engines use a high-pressure common rail (HPCR) fuel system that utilizes electronically controlled fuel injectors. The HPCR also uses extremely high fuel pressure (>20,000 psi). Using the **Injector Test**, fuel injectors can be cancelled (shut off). This control will allow you to shut off each injector to determine if it is causing the engine to run incorrectly.

1. Click **RUN** to select **Injector Test** (highlighted green).

Manual	Stop button	Run button	Description	ENG Run	Measured	Desired	Unit	Graph	ECU
<input type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	0	0	r/min	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		0	-	<input type="radio"/>	Engine
<input checked="" type="radio"/>	[STOP]	[RUN]	Injector Test	-		000	-	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not		0.0	%	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not		0.0	%	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0	0	-	<input type="radio"/>	Engine

2. From **Password authentication** window:

- a. Enter your password.
- b. Click **Set**.

3. From the **Injector Test** window:

- a. Select the injector you want to cancel:
  - i. Clicking the down arrow, will turn the injector OFF.
  - ii. Clicking the up arrow will turn the injector back ON.

**Note:** Yanmar numbers their cylinders starting at the flywheel.

- b. Click **Set**.

4. The engine will now cancel the injector(s), and you need to observe how the engine runs. Continue canceling all the injectors to determine if one is causing poor engine performance.

## Intake Throttle Position Control

The intake throttle valve is used during regeneration to limit the incoming air into the engine. This creates a rich fuel mixture that will increase the internal temperature of the engine to aid in regeneration. The intake throttle valve can be operated using this process.

1. To begin, remove the intake throttle valve from the engine, but leave the harness connected.

2. Click **Run** to select **Intake Throttle Position Control** (highlighted green).

Manual	Stop button	Run button	Description	ENG Run	Measured	Desired	Unit	Graph	ECU
<input type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	0	0	r/min	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		0	-	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Injector Test	-		000	-	<input type="radio"/>	Engine
<input checked="" type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not		0.0	%	<input checked="" type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not		0.0	%	<input type="radio"/>	Engine
<input type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0	0	-	<input type="radio"/>	Engine

3. From the **Password authentication** window:

- a. Enter your password.
- b. Click **Set**.

4. From the **Data Set** window, in the **Desired** box:

- a. Enter the number shown in the **Max** box above.

**Note:** For the intake throttle position control to operate, crank the engine for a few seconds before you click **Set**.

The ECU needs to see a crank position signal before it will command the intake throttle valve to open.

- b. After cranking the engine:
  - i. Click **Set**.

5. Confirm the movement of the Intake throttle valve plate.

6. Turning key switch to OFF will stop the test and return valve plate to its normal position.

## DPF Active Regeneration

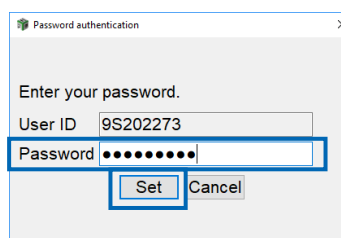
The Yanmar engine has four different E-ECU controlled regenerations. DPF Active Regeneration allows you to manually run any one of the four regenerations. If a customer ignores the request for a stationary/parked regeneration the engine will fault and go into a de-rate mode. Using DPF Active Regeneration is the only way to clear the fault and get the engine out of de-rate mode.

1. Click **Run** to select **DPF Active Regeneration** (highlighted green).

Diagnostic Tests - Active Control						
Manual	Stop button	Run button	Description	ENG Run	Measured	Desired
<input type="radio"/>	[STOP]	[RUN]	Direct Engine RPM Control	req	702	700
<input type="radio"/>	[STOP]	[RUN]	Direct EGR Valve Control	not		16
<input type="radio"/>	[STOP]	[RUN]	Injector Test	-		0000
<input type="radio"/>	[STOP]	[RUN]	Intake Throttle Position Control	not		0.0
<input type="radio"/>	[STOP]	[RUN]	Exhaust Throttle Position Control	not		0.0
<input checked="" type="radio"/>	[STOP]	[RUN]	DPF Active Regeneration	req	0	0

2. From the **Password authentication** window:

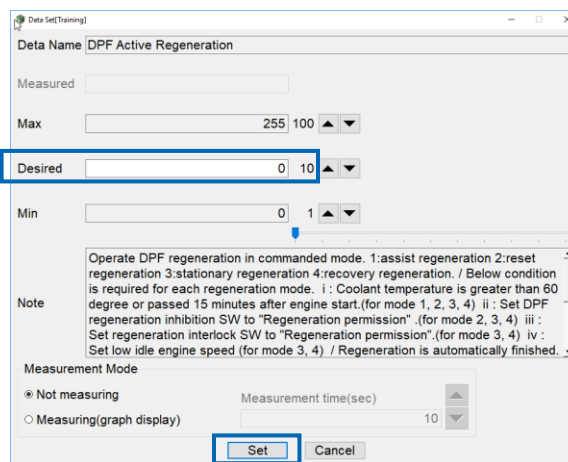
- a. Enter your password.
- b. Click **Set**.



3. In the **Desired** box:

- a. Enter the number of the regeneration to be performed:
  - 1 - Assist Regeneration
  - 2 - Reset Regeneration
  - 3 - Stationary/Parked
  - 4 - Recovery Regeneration
- b. Click **Set**

**Note:** It will take 10–15 seconds before the engine RPM will start to increase.



4. For the regeneration to start:

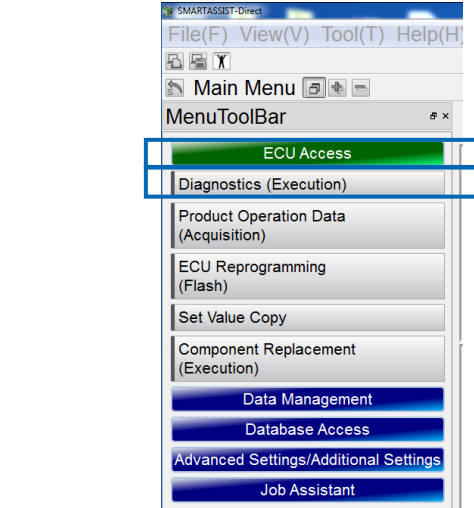
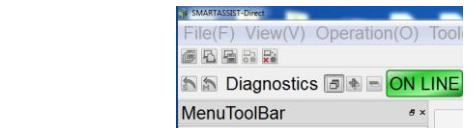
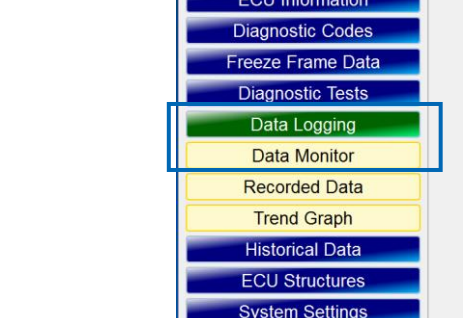
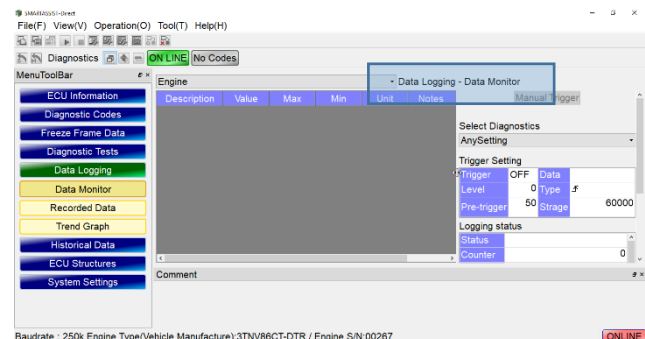
- a. The engine coolant temperature must be greater than 60 °C (140 °F)
- b. The parking brake must be set
- c. The engine RPM is set to idle.

5. When regeneration is complete, the engine will return to idle.

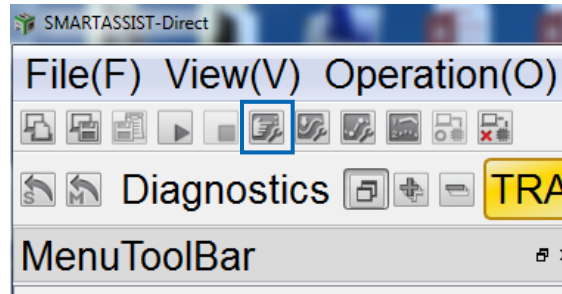
## Data Logging/Data Monitor

SmartAssist - Direct allows you to record engine data parameters and gives you the ability to graph that data to help you visually analyze it. Below are step-by-step instructions for setting up SA-D to record the data. At first it will not seem intuitive to use, but once you have done it a few times, it will become easier.

**Note:** Ensure you have performed the steps to connect to the ECU, and log into SmartAssist.

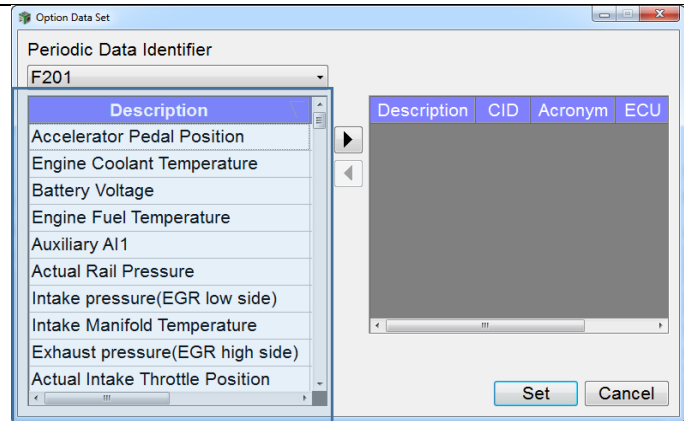
<ol style="list-style-type: none"> <li>1. From the <b>Main Menu</b>:             <ol style="list-style-type: none"> <li>a. Verify that the key switch is in the ON position.</li> <li>b. Click <b>ECU Access</b>.</li> <li>c. Click <b>Diagnostics (Execution)</b>.</li> </ol> </li> </ol>	
<ol style="list-style-type: none"> <li>2. From the <b>Diagnostics</b> menu:             <ol style="list-style-type: none"> <li>a. Click <b>Data Logging</b>.</li> </ol> </li> </ol>	
<ol style="list-style-type: none"> <li>3. From the <b>Data Logging</b> options:             <ol style="list-style-type: none"> <li>a. Click <b>Data Monitor</b>.</li> </ol> </li> </ol>	
<ol style="list-style-type: none"> <li>4. From the <b>Data Logging – Data Monitor</b> screen, set up the parameters you wish to record. This can be done in two ways—you can:             <ol style="list-style-type: none"> <li>a. Select specific parameters you want to record from a list.</li> <li>b. Choose a pre-selected group of parameters and customize as needed.</li> </ol> <p>Both options will be reviewed.</p> </li> </ol>	

5. To select specific parameters to record:
  - a. Click **Option Data Set**.



6. From the **Option Data Set** window, the left column contains all the different data items (parameters) that can be used for data logging.

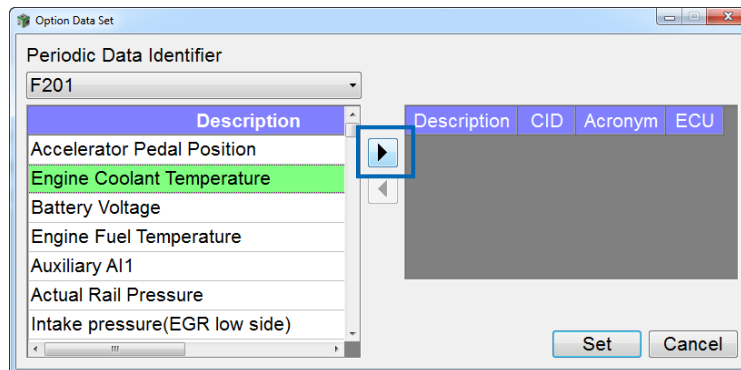
**Note:** Click the column heading **Description** to sort alphabetically in ascending or descending order. This makes it easier to find parameters.



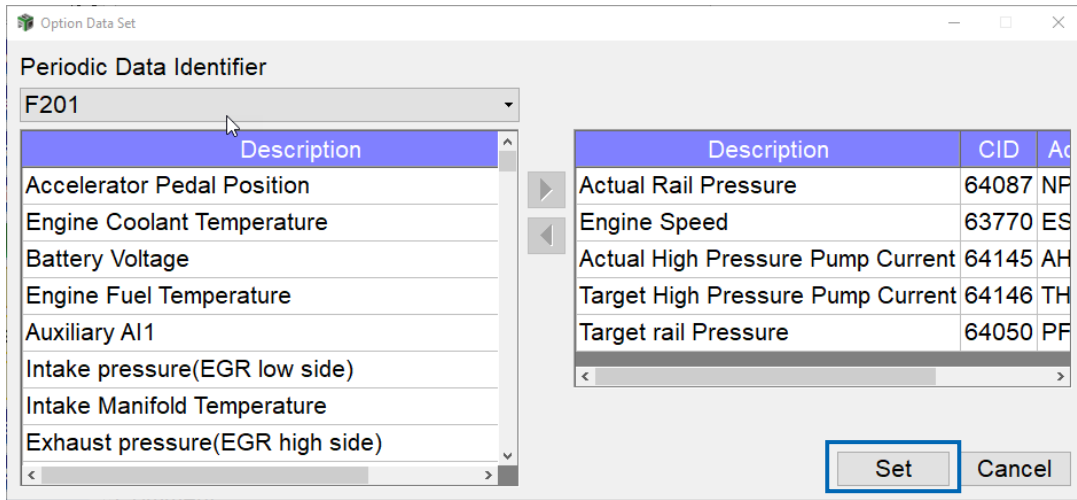
7. The parameters you want to record from the left side will need to be moved to the window on the right side. There are two ways to do this:
  - a. Double-clicking on the parameter will move it to the window on the right.

OR

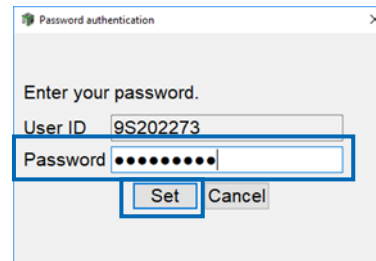
- b. Click the parameter, then click the right arrow to move it to the window on the right.



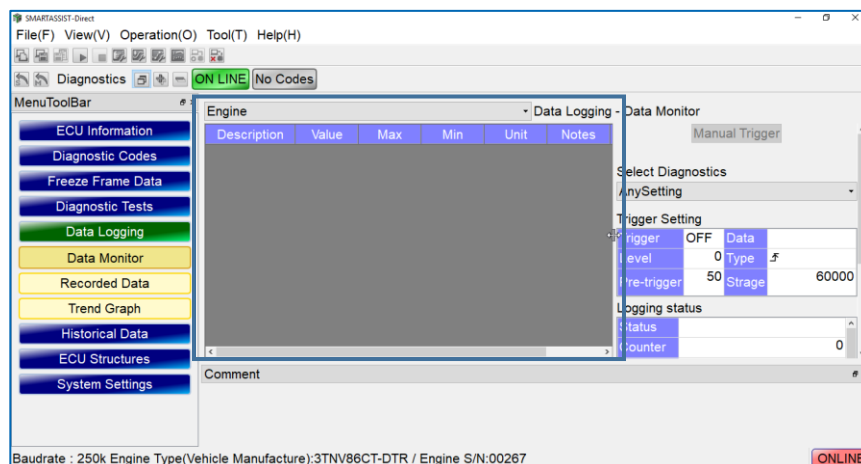
8. In the example below, parameters from the left have been moved to the right window:
  - a. When all the parameters have been selected:
    - i. Click **Set**.



9. From the **Password authentication** window:
  - a. Enter your password.
  - b. Click **Set**.



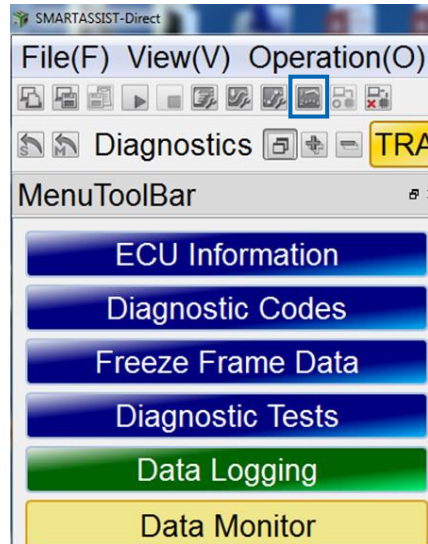
10. From the **Data Logging – Data Monitor** screen, you may not see the parameters you just selected and set in Steps 7 thru 9, as shown in the image below:
  - a. To view these parameters, you will need to complete Steps 11 thru 18.



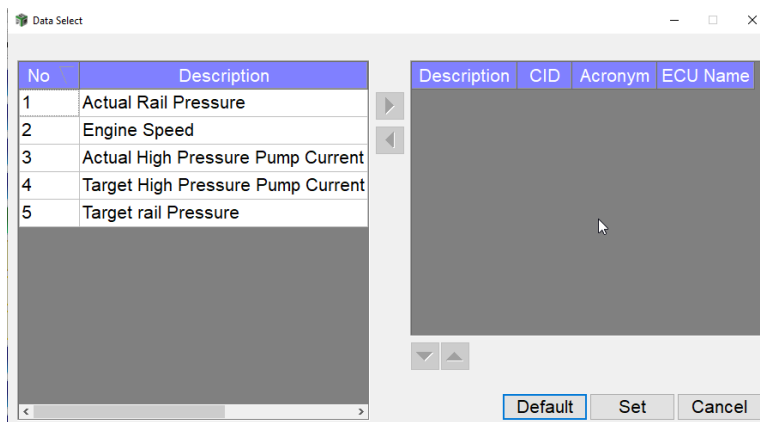


11. To access set parameters:

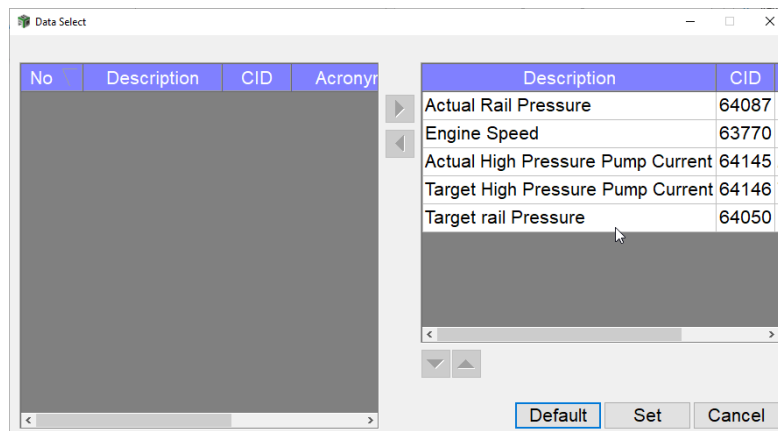
- a. Click **Data Set**.



12. From the **Data Select** window, you can refine the parameters you wish to log. The parameters selected in Step 7 will be listed on the left side. Move the parameters you want to log to the right window, as shown in Steps 7 and 8.

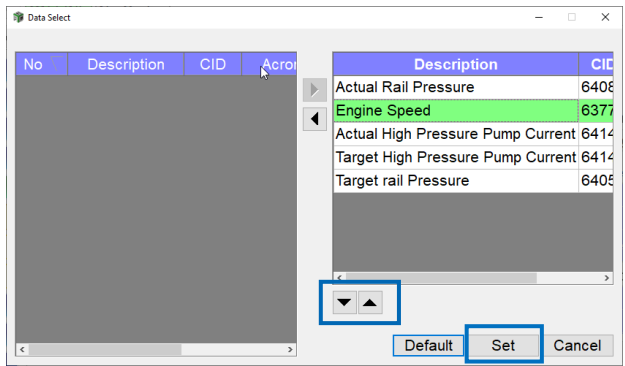


13. Double-click each parameter to move it to the right side.



14. To rearrange the order of the parameters in the right-hand side:

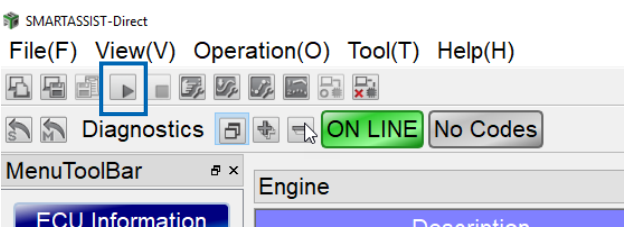
- Click a parameter (highlighted green).
- Use the up/down arrows at the bottom of the list to move the item to the desired position.
- Click **Set**.



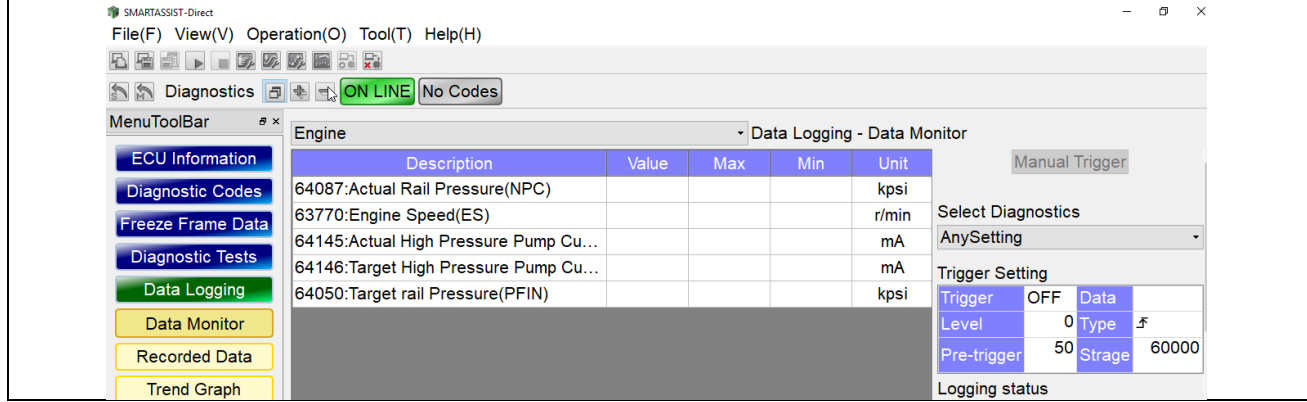
15. The requested parameters should now be visible in the **Data Logging – Data Monitor** window. However, the data is not being logged.

16. To start viewing live data:

- Click **Start**.



17. Data values are now visible in the **Data Logging** screen, where they can be monitored in real time. However, at this point, data is NOT being recorded.



18. The red messages on screen, as shown below, tells you that data is display data only. It is not recording because it has not received a trigger to start recording.

The screenshot shows the SMARTASSIST-Direct software interface. The main window is titled "Data Logging - Data Monitor" and displays a table of engine data. The table has columns for Description, Value, Max, Min, and Unit. The data rows are:

Description	Value	Max	Min	Unit
64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi
63770:Engine Speed(ES)	0	0	0	r/min
64145:Actual High Pressure Pump Curr...	2	4	2	mA
64146:Target High Pressure Pump Curr...	1389	1389	1389	mA
64050:Target rail Pressure(PFIN)	4	4	4	kpsi

On the right side of the interface, there are several panels:

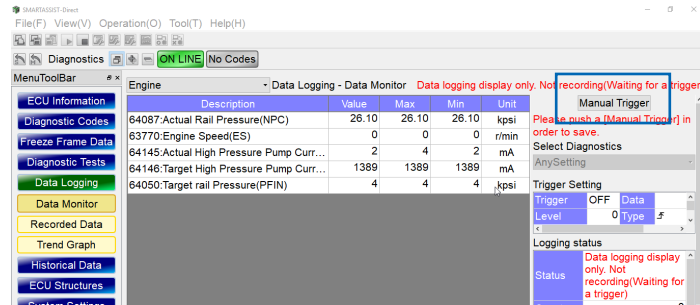
- Manual Trigger:** A button labeled "Manual Trigger".
- Trigger Setting:** A section with "Trigger" set to "OFF" and "Data" selected. Below it, "Level" is set to "0" and "Type" is set to "F".
- Logging status:** A section with "Status" set to "Data logging display only. Not recording(Waiting for a trigger)".

Red text messages are visible on the screen, including "Data logging display only. Not recording(Waiting for a trigger)" and "Please push a [Manual Trigger] in order to save." The interface also shows a menu bar with "File(F)", "View(V)", "Operation(O)", "Tool(T)", and "Help(H)", and a toolbar with various icons.


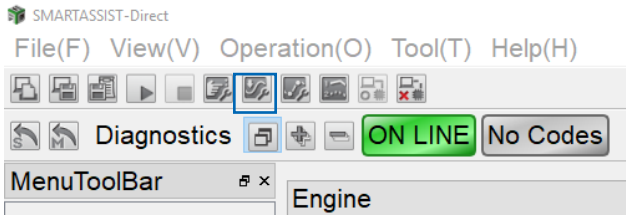
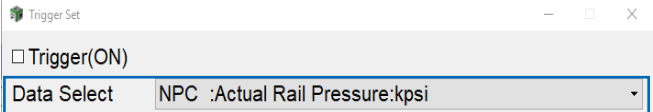
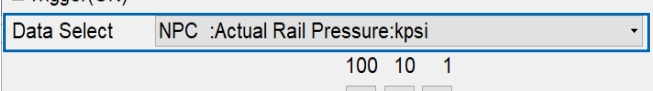
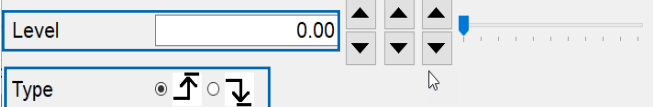
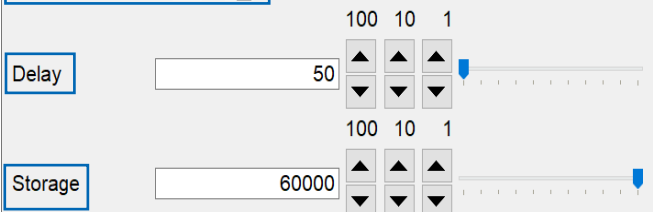
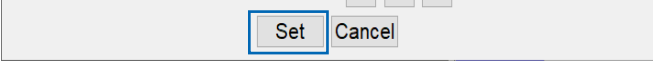
## Triggers

To log the data to memory, a trigger must be set to start this process. The messages in red, as seen above, are data logging display only, and are waiting for a trigger. There are two types of triggers:

**Manual trigger:** This is simply starting the recording by clicking the **Manual Trigger** button on the top right-hand corner of the screen. This is the most common method of starting a recording.



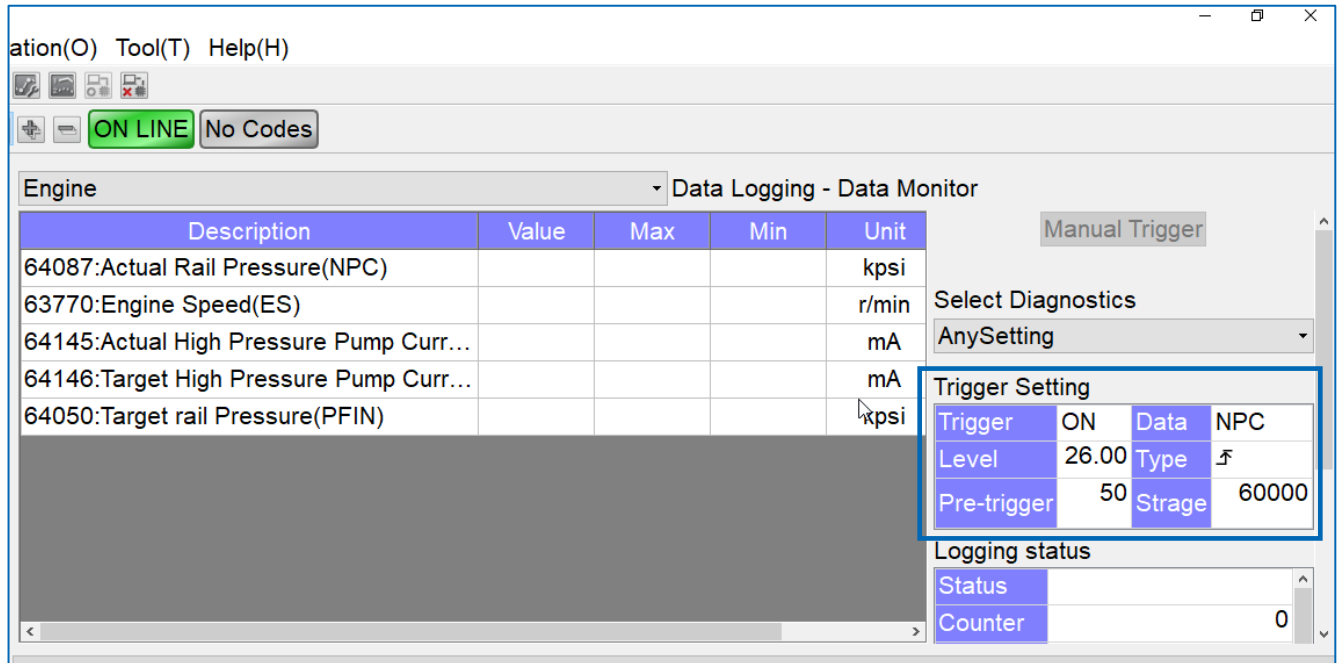
**Automatic trigger:** This will allow you to set a parameter that automatically starts the recording once a condition is met. The **Trigger Set** button allows you to set this feature.

<p>1. To configure an automatic trigger:</p> <p>a. Click <b>Trigger Set</b>.</p> 	
<p>2. From the <b>Trigger Set</b> window:</p> <p>a. Select the <b>Trigger (ON)</b> check box.</p>	
<p>3. In the <b>Data Select</b> dropdown:</p> <p>a. Select the parameter you want to use (you can only select one).</p>	
<p>4. In the <b>Level</b> box:</p> <p>a. Set the value you want the trigger to start at.</p>	
<p>5. In the <b>Type</b> area:</p> <p>a. Select the trigger option to start when the value goes UP to the <b>Level</b>.</p> <p>b. Select the trigger option to start when the value comes DOWN to the <b>Level</b>.</p>	
<p>6. In the <b>Delay</b> and <b>Storage</b> boxes, leave the defaults as shown. Then click <b>Set</b>.</p>	

Automatic Set Trigger Example:

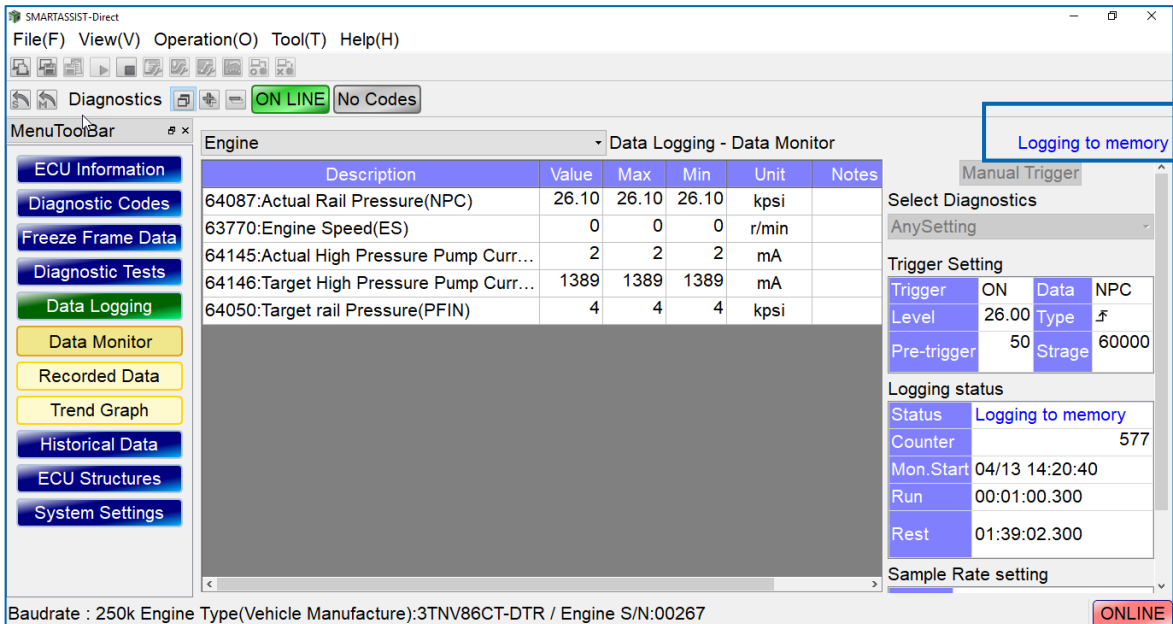
In the example below, an automatic trigger was set. This appears in the **Trigger Setting** area of the **Data Logging – Data Monitor** screen:

1. **Trigger:** On
2. **Data:** NPC – Actual Rail Pressure
3. **Level:** 26 kpsi
4. **Type:** Trigger will start the recording when pressure rises to 26 kpsi.




## Logging/Saving Custom Data to Memory

After clicking **Manual Trigger**, or when the Automatic Trigger activates, data will begin logging to memory. A “Logging to memory” message will appear in the top right-hand corner when this process begins. Continue to log data as needed to capture the issue.

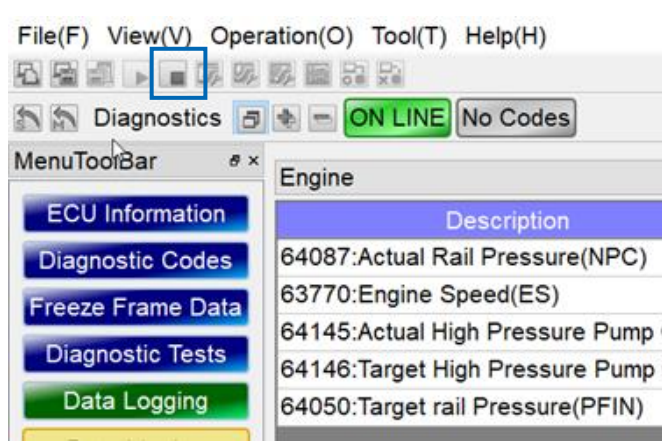


1. When you have finished logging data:

a. Click **Stop**.




**Note:** This will stop the logging but **will NOT** save the data. There is **NO** prompt to save the data recording!

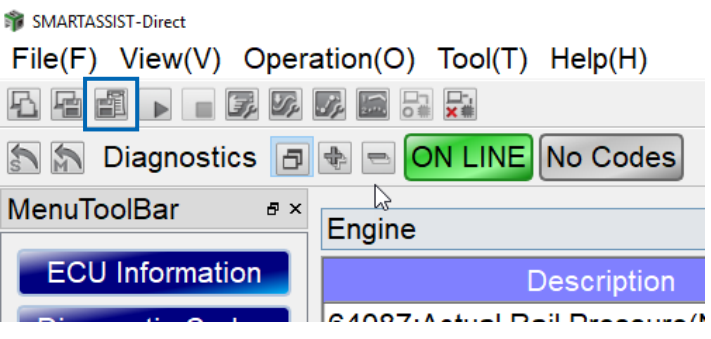


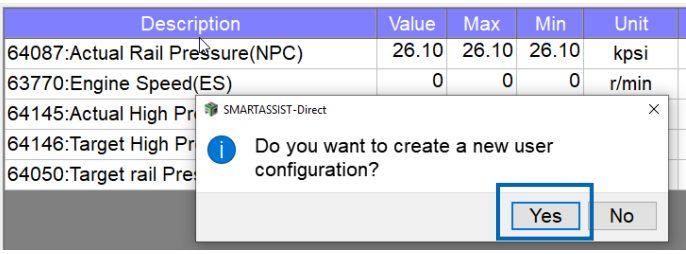
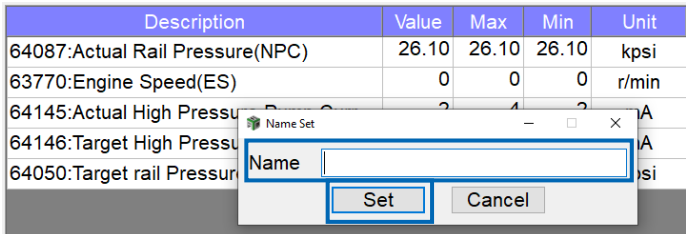
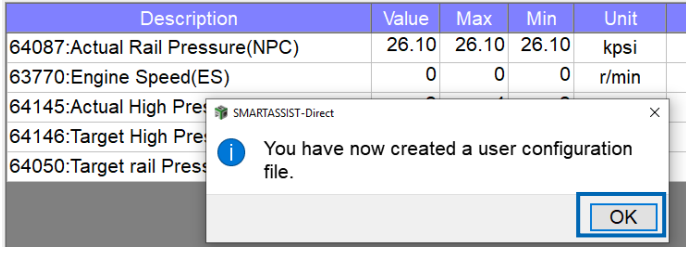
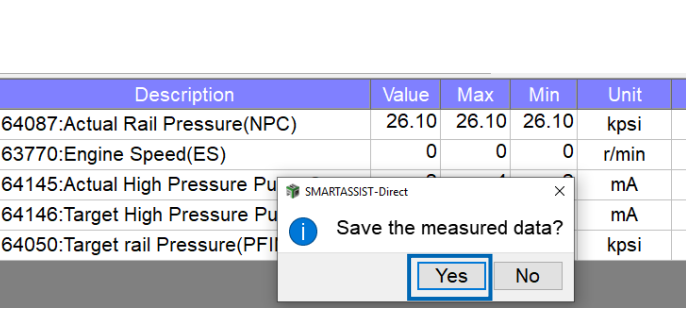
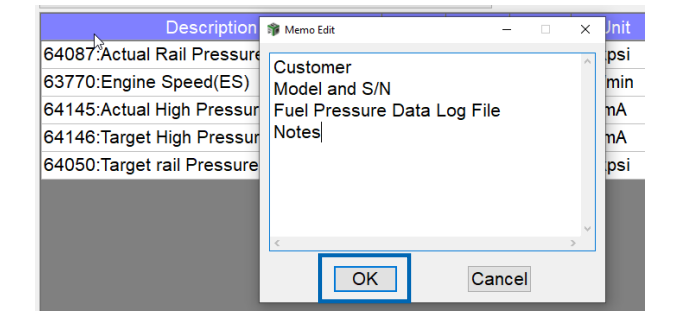
2. To save the logged data:

a. Click the **Meas Data Save** icon.



**Note:** This step must be done to save the data recording.



<p>3. After clicking <b>Meas Data Save</b>, a confirmation message appears, asking if you want to create a new user configuration:</p> <ol style="list-style-type: none"> <li>Click <b>No</b> to discard. Go to Step 6.</li> <li>Click <b>Yes</b> to save. Go to Step 4.</li> </ol>	 <table border="1" data-bbox="771 178 1453 273"> <thead> <tr> <th>Description</th> <th>Value</th> <th>Max</th> <th>Min</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>64087:Actual Rail Pressure(NPC)</td> <td>26.10</td> <td>26.10</td> <td>26.10</td> <td>kpsi</td> </tr> <tr> <td>63770:Engine Speed(ES)</td> <td>0</td> <td>0</td> <td>0</td> <td>r/min</td> </tr> <tr> <td>64145:Actual High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64146:Target High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64050:Target rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> </tbody> </table>	Description	Value	Max	Min	Unit	64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi	63770:Engine Speed(ES)	0	0	0	r/min	64145:Actual High Pressure				mA	64146:Target High Pressure				mA	64050:Target rail Pressure				kpsi
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64050:Target rail Pressure				kpsi																											
<p>4. From the <b>Name Set</b> window:</p> <ol style="list-style-type: none"> <li>Enter the name the new logging file set in the Name box.</li> </ol> <p><b>Tip:</b> Give the file a meaning name so it can be easily found.</p> <ol style="list-style-type: none"> <li>Click <b>Set</b>.</li> </ol>	 <table border="1" data-bbox="771 504 1453 598"> <thead> <tr> <th>Description</th> <th>Value</th> <th>Max</th> <th>Min</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>64087:Actual Rail Pressure(NPC)</td> <td>26.10</td> <td>26.10</td> <td>26.10</td> <td>kpsi</td> </tr> <tr> <td>63770:Engine Speed(ES)</td> <td>0</td> <td>0</td> <td>0</td> <td>r/min</td> </tr> <tr> <td>64145:Actual High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64146:Target High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64050:Target rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> </tbody> </table>	Description	Value	Max	Min	Unit	64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi	63770:Engine Speed(ES)	0	0	0	r/min	64145:Actual High Pressure				mA	64146:Target High Pressure				mA	64050:Target rail Pressure				kpsi
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<p>5. In the window, a message will display informing that a new user configuration file was created:</p> <ol style="list-style-type: none"> <li>Click <b>OK</b>.</li> </ol>	 <table border="1" data-bbox="771 808 1453 903"> <thead> <tr> <th>Description</th> <th>Value</th> <th>Max</th> <th>Min</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>64087:Actual Rail Pressure(NPC)</td> <td>26.10</td> <td>26.10</td> <td>26.10</td> <td>kpsi</td> </tr> <tr> <td>63770:Engine Speed(ES)</td> <td>0</td> <td>0</td> <td>0</td> <td>r/min</td> </tr> <tr> <td>64145:Actual High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64146:Target High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64050:Target rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> </tbody> </table>	Description	Value	Max	Min	Unit	64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi	63770:Engine Speed(ES)	0	0	0	r/min	64145:Actual High Pressure				mA	64146:Target High Pressure				mA	64050:Target rail Pressure				kpsi
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64050:Target rail Pressure				kpsi																											
<p>6. Another confirmation message appears, asking if you would like to save the measured data (logging file):</p> <ol style="list-style-type: none"> <li>Click <b>No</b> to discard the recorded data log.</li> <li>Click <b>Yes</b> to save the recorded data log.             <ol style="list-style-type: none"> <li>This option allows you to add information about the data log.</li> </ol> </li> </ol>	 <table border="1" data-bbox="771 1102 1453 1197"> <thead> <tr> <th>Description</th> <th>Value</th> <th>Max</th> <th>Min</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>64087:Actual Rail Pressure(NPC)</td> <td>26.10</td> <td>26.10</td> <td>26.10</td> <td>kpsi</td> </tr> <tr> <td>63770:Engine Speed(ES)</td> <td>0</td> <td>0</td> <td>0</td> <td>r/min</td> </tr> <tr> <td>64145:Actual High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64146:Target High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64050:Target rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> </tbody> </table>	Description	Value	Max	Min	Unit	64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi	63770:Engine Speed(ES)	0	0	0	r/min	64145:Actual High Pressure				mA	64146:Target High Pressure				mA	64050:Target rail Pressure				kpsi
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64146:Target High Pressure				mA																											
64050:Target rail Pressure				kpsi																											
<p>7. If you clicked <b>Yes</b> to save the recorded data log, the <b>Memo Edit</b> window appears:</p> <ol style="list-style-type: none"> <li>Enter the following information:             <ol style="list-style-type: none"> <li>Machine model</li> <li>Serial number</li> <li>Customer Name</li> <li>Short description of the log file</li> </ol> </li> <li>Click <b>OK</b>.</li> </ol>	 <table border="1" data-bbox="771 1480 1453 1575"> <thead> <tr> <th>Description</th> <th>Value</th> <th>Max</th> <th>Min</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>64087:Actual Rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> <tr> <td>63770:Engine Speed(ES)</td> <td></td> <td></td> <td></td> <td>r/min</td> </tr> <tr> <td>64145:Actual High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64146:Target High Pressure</td> <td></td> <td></td> <td></td> <td>mA</td> </tr> <tr> <td>64050:Target rail Pressure</td> <td></td> <td></td> <td></td> <td>kpsi</td> </tr> </tbody> </table>	Description	Value	Max	Min	Unit	64087:Actual Rail Pressure				kpsi	63770:Engine Speed(ES)				r/min	64145:Actual High Pressure				mA	64146:Target High Pressure				mA	64050:Target rail Pressure				kpsi
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8. A message appears, indicating that the measured data (logging file) was saved:

a. Click **OK**.

Description	Value	Max	Min	Unit
64087:Actual Rail Pressure(NPC)	26.10	26.10	26.10	kpsi
63770:Engine Speed(ES)	0	0	0	r/min
64145:Actual High Pressure Pump Curr	2	4	2	mA
64146:Target High Pressure Pump Curr	39			mA
64050:Target rail Pressure(PFIN)	4			kpsi

SMARTASSIST-Direct

Measure data saved.

OK

The data log is now successfully stored in SmartAssist - Direct program.



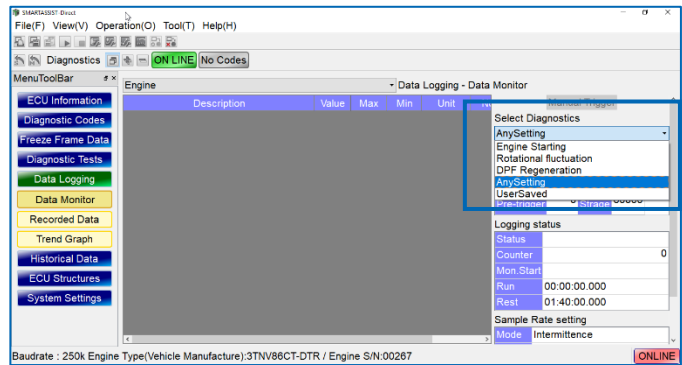
## Logging Predefined Data Sets

In the previous section, we created a custom logging set to log data on the fuel system. When the logging was completed, the logging set was saved.

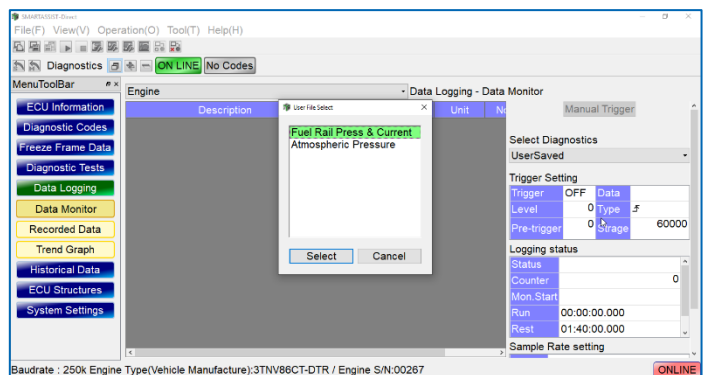
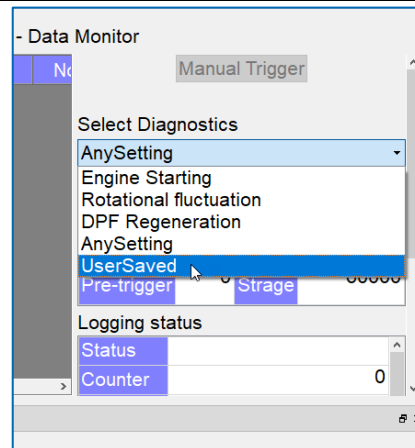
Yanmar has default logging sets that can be used, so you do not have to create a data logging set from scratch, which saves time. To access the predefined logging sets, follow the steps below.

1. In the **Select Diagnostics** section of the **Data Logging – Data Monitor** screen:
  - a. Click the **AnySetting** dropdown menu.
  - b. Select from one of the three predefined data logging options:
    - i. Engine Starting
    - ii. Rotational Fluctuation
    - iii. DPF Regeneration

**Note:** These predefined lists can be edited by clicking **Data Set** and editing the parameter list.

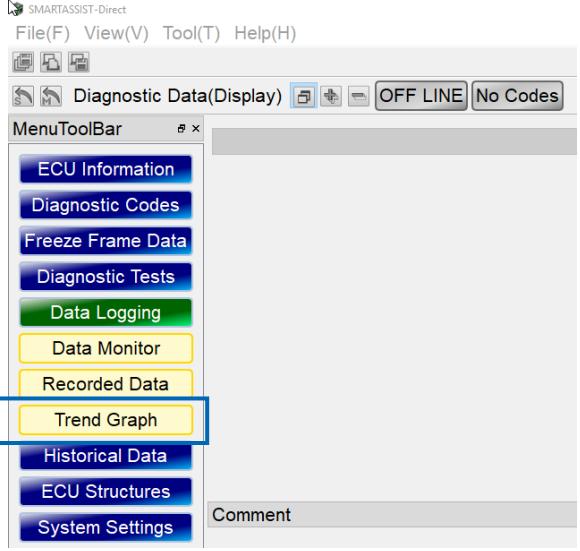
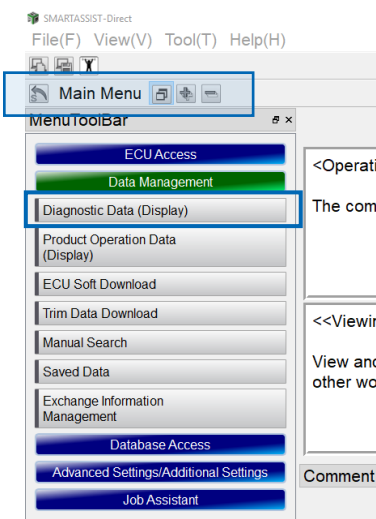
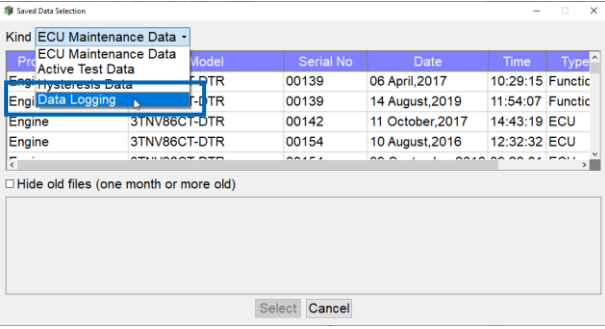


2. Under the **AnySettings** dropdown menu you will also see **UserSaved**.
  - a. This folder contains all data logging configurations that have been created and saved.
  - b. Click **UserSaved** to view the saved files.



## Data Logging/Trend Graph

The logging data can be displayed as a graph, either while recording the data or graphing a data log file saved in SmartAssist.

<ol style="list-style-type: none"> <li>1. To view a graph while viewing or recording a data log file within <b>Data Monitor</b>:             <ol style="list-style-type: none"> <li>a. Click <b>Trend Graph</b>.</li> </ol> </li> </ol>																																
<ol style="list-style-type: none"> <li>2. The Trend Graph will open and need to be set up as described in Steps 3 thru 11.</li> </ol>																																
<ol style="list-style-type: none"> <li>3. To graph a saved Data Log file:             <ol style="list-style-type: none"> <li>a. Access the <b>Main Menu</b>.</li> <li>b. On the <b>Data Management</b> menu:                 <ol style="list-style-type: none"> <li>i. Click <b>Diagnostic Data (Display)</b>.</li> </ol> </li> </ol> </li> </ol>																																
<ol style="list-style-type: none"> <li>4. In the <b>Saved Data Selection</b> window:             <ol style="list-style-type: none"> <li>a. Click the dropdown arrow in the <b>Kind</b> box.</li> <li>b. Click <b>Data Logging</b>.</li> </ol> <p><b>Note:</b> This will display all the saved data logging files.</p> </li> </ol>	 <table border="1" data-bbox="820 1596 1421 1732"> <thead> <tr> <th>Kind</th> <th>ECU Maintenance Data</th> <th>Model</th> <th>Serial No</th> <th>Date</th> <th>Time</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>ECU Maintenance Data</td> <td>3TNV88CT-DTR</td> <td>00139</td> <td>06 April, 2017</td> <td>10:29:15</td> <td>Function</td> </tr> <tr> <td>Active Test Data</td> <td>3TNV88CT-DTR</td> <td>00139</td> <td>14 August, 2019</td> <td>11:54:07</td> <td>Function</td> </tr> <tr> <td>Engine Data Logging</td> <td>3TNV88CT-DTR</td> <td>00142</td> <td>11 October, 2017</td> <td>14:43:19</td> <td>ECU</td> </tr> <tr> <td>Engine</td> <td>3TNV88CT-DTR</td> <td>00154</td> <td>10 August, 2016</td> <td>12:32:32</td> <td>ECU</td> </tr> </tbody> </table>	Kind	ECU Maintenance Data	Model	Serial No	Date	Time	Type	ECU Maintenance Data	3TNV88CT-DTR	00139	06 April, 2017	10:29:15	Function	Active Test Data	3TNV88CT-DTR	00139	14 August, 2019	11:54:07	Function	Engine Data Logging	3TNV88CT-DTR	00142	11 October, 2017	14:43:19	ECU	Engine	3TNV88CT-DTR	00154	10 August, 2016	12:32:32	ECU
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Engine	3TNV88CT-DTR	00154	10 August, 2016	12:32:32	ECU																											

5. From the **Saved Data Selection** window, a listing of the data logged files will appear:

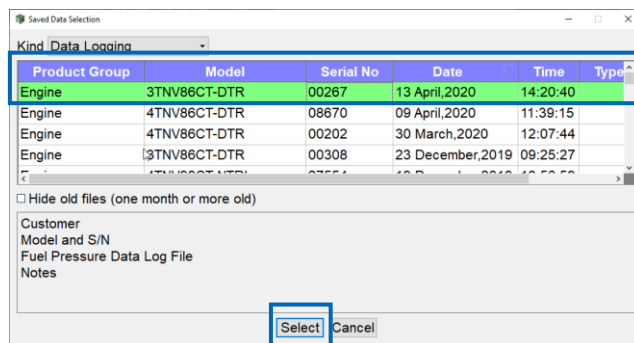
- a. Click any column heading to sort in ascending or descending order.

**Note:** The example screen shown is displaying files sorted by date, in descending order

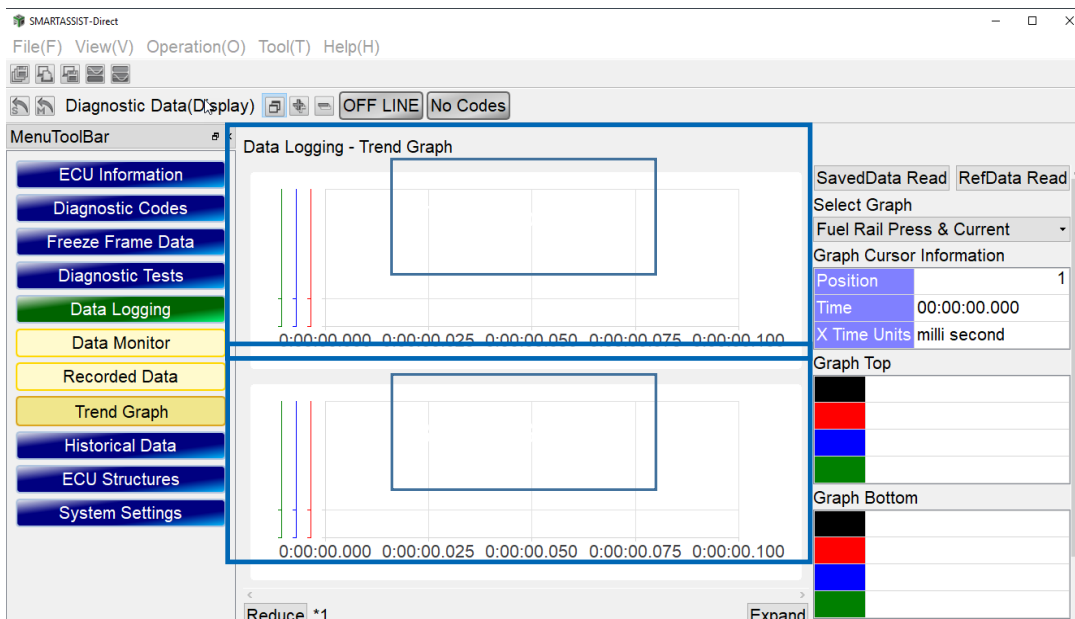
- b. Click a file to graph (the row highlights green).

**Note:** Any notes entered when saving the file will appear in the box below the file list.

- c. Click **Select**.



6. The following trend graph appears. The trend graph form consists of two sections: a top and bottom graph. Each section can display up to four items each.

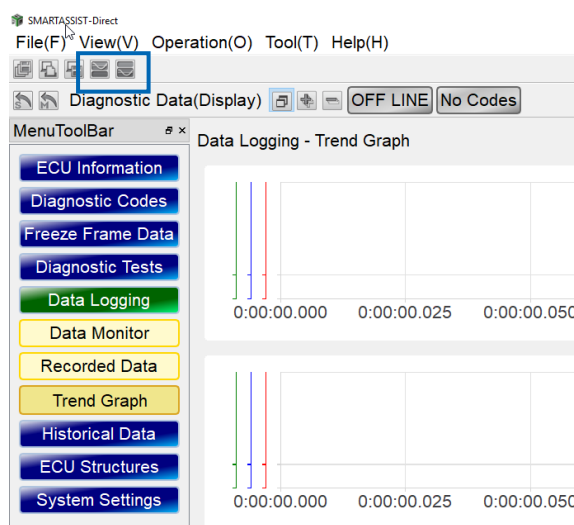


6. To set up a trend graph:

- a. Click **Top Graph Setting** to set up the top graph.

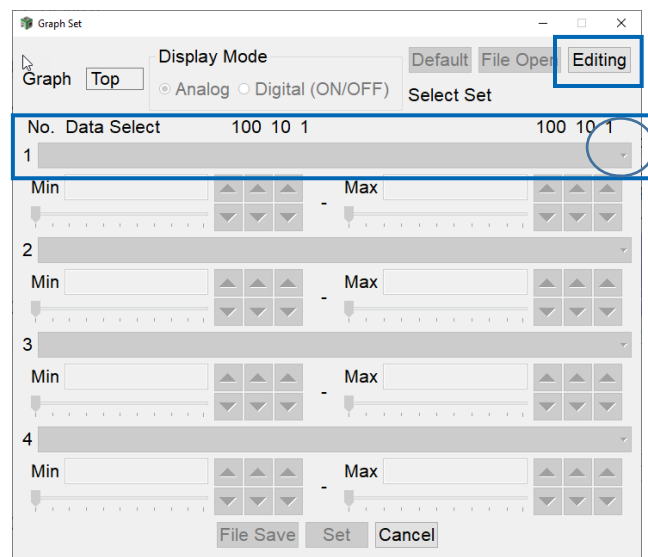


- b. Click **Bottom Graph Setting** to set up the bottom graph.



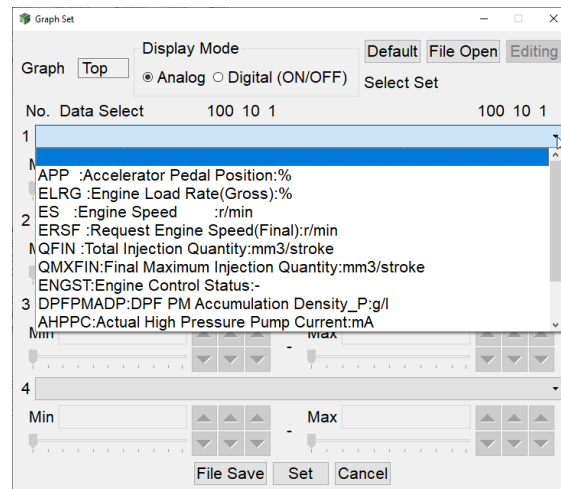
7. Clicking **Top Graph Setting** or **Bottom Graph Setting** will display the **Graph Set** window:

- a. Click **Editing**.
- b. Click the **Data Select** dropdown arrow to display the list.



8. From the **Data Select** dropdown menu:

- a. Select the parameter(s) to graph (up to four).



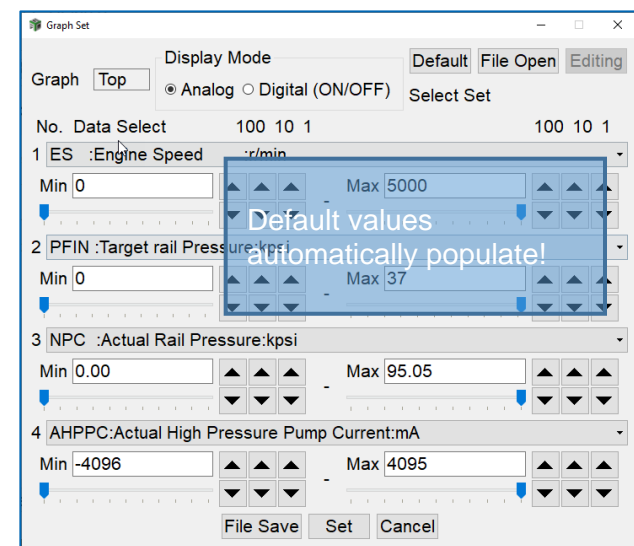
9. Once parameters have been selected in the Graph Set window:

- a. Adjust any **Min** and **Max** values for the parameters (if needed).

Notes:

SmartAssist – Direct displays default values (as pictured) that do not graph well. Choosing the correct **Min** and **Max** values will provide a better resolution for your graph. See [General Graphing Guidelines](#) on page 45 prior to clicking **Set**.

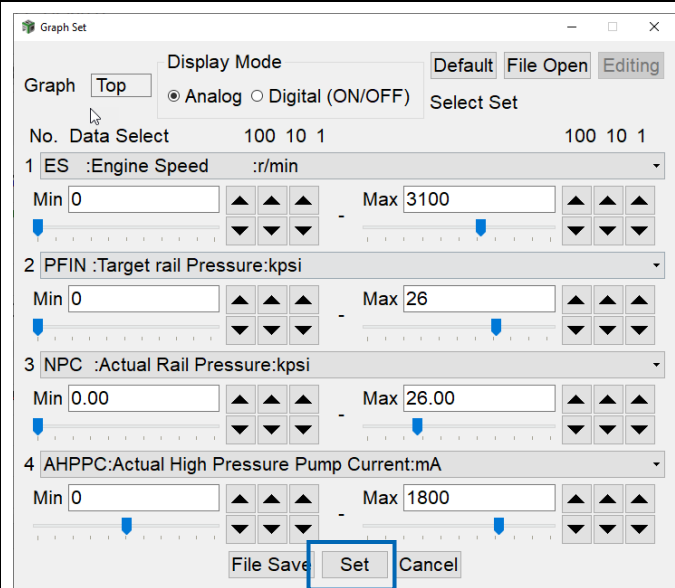
- b. Click **Set**.



10. When you have finished entering the **Min** and **Max** for the parameters:

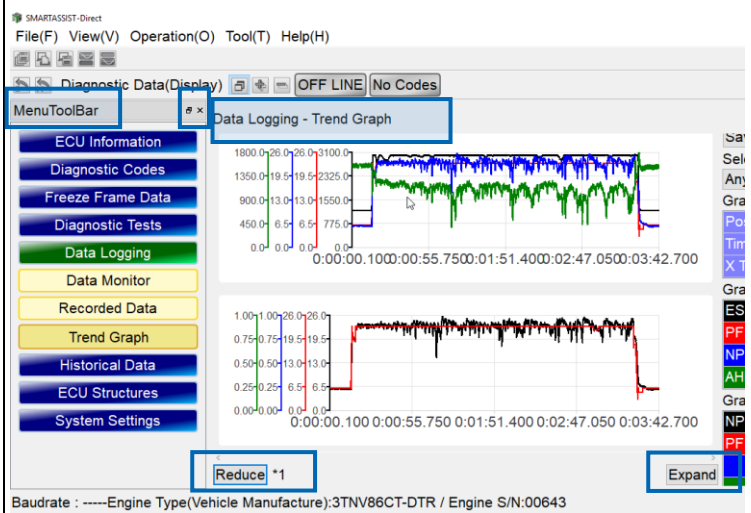
- a. Click **Set**.

**Note:** Setting the **Min** and **Max** values is very important to get a good trend graph.



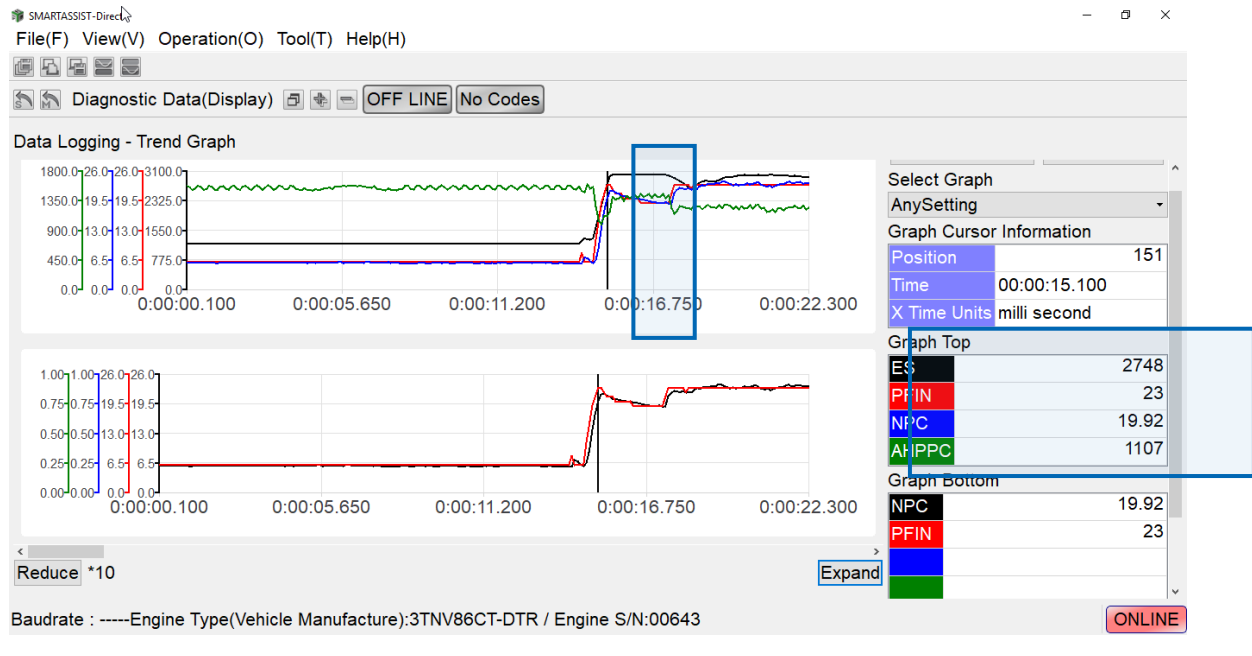
11. The **Data Logging - Trend Graph** is now displaying your parameters on the trend graph:

- a. To expand you graph, and hide the **MenuToolBar** section:
  - i. Click the **X**.
- b. To zoom in on the trend graph:
  - i. Click **Expand**.
- c. To reduce the trend graph size:
  - i. Click **Reduce**:
    - o 1 equals zoomed out
    - o 10 equals zoomed in



12. To get specific details regarding a point on the graph:

- a. Place your cursor on a point on the graph and click the left mouse button.
  - i. This action will place a vertical line on the chart, and
  - ii. Values of that point in time will be displayed in the **Graph Top** section.



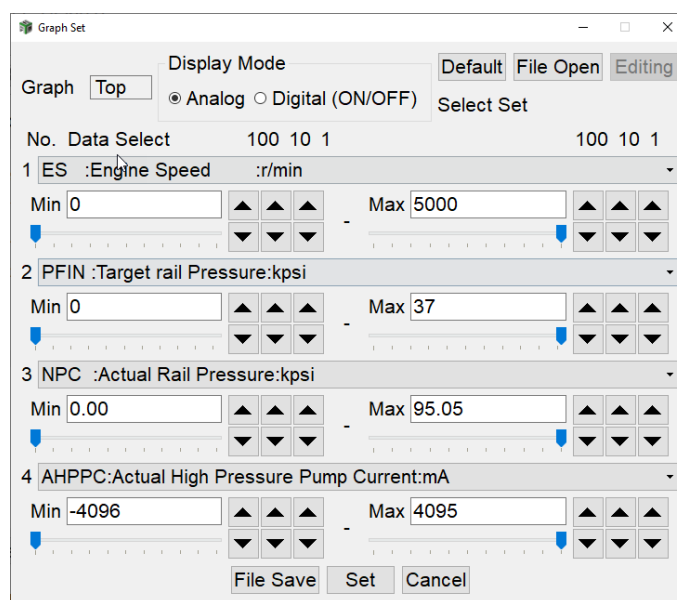
## General Graphing Guidelines

Choosing the correct **Min** and **Max** values will provide a better resolution for your graph.

The **Graph Set** window shows the default values.

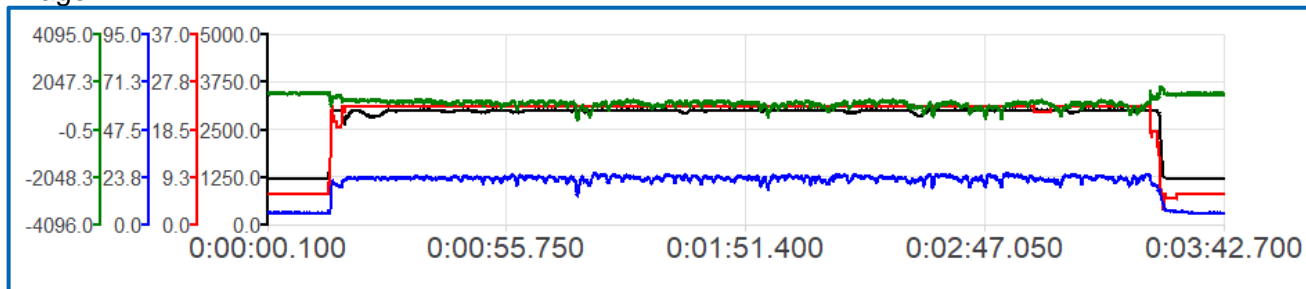
Modify these using the recommended numbers below:

- Set **Engine Speed Max** to 3300.
- Set **Target rail Pressure Max** value to 26 kpsi
- Set **Pressure Pump current**:
  - **Max** value to around 1800ma
  - **Min** value to zero



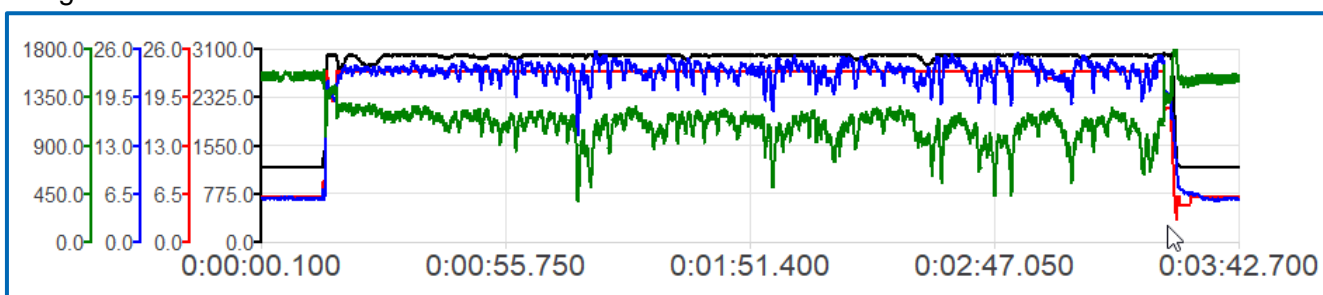
Using the SmartAssist - Direct default numbers, there is not much detail, which makes it difficult to see variations in the signal, as shown in **Image A**.

Image A



Using the recommended adjusted numbers from the chart above, more detail is displayed in the graph, as shown in **Image B**.

Image B



The **Min/Max** values may have to be adjusted to get the most detail from the wave form. Keeping **Min** and **Max** values close together helps show more detail in graph.

Below is a table with Max and Min values to start with when creating a trend graph.

**Pressures**

<b>Fuel</b>	0–26	kpsi
<b>EGR</b>	0–20	psi
<b>DPF</b>	0–20	psi

**Temperature Sensors**

<b>Intake</b>	0–120	degrees Fahrenheit
<b>Exhaust</b>	0–1000	degrees Fahrenheit
<b>EGR</b>	0–1000	degrees Fahrenheit
<b>DPF Inlet</b>	0–1300	degrees Fahrenheit
<b>DPF Intermediate</b>	0–1300	degrees Fahrenheit
<b>Coolant</b>	0–200	degrees Fahrenheit
<b>Fuel</b>	0–200	degrees Fahrenheit

**Voltage**

<b>Battery</b>	0–20	Vdc
<b>Sensors</b>	0–5	Vdc

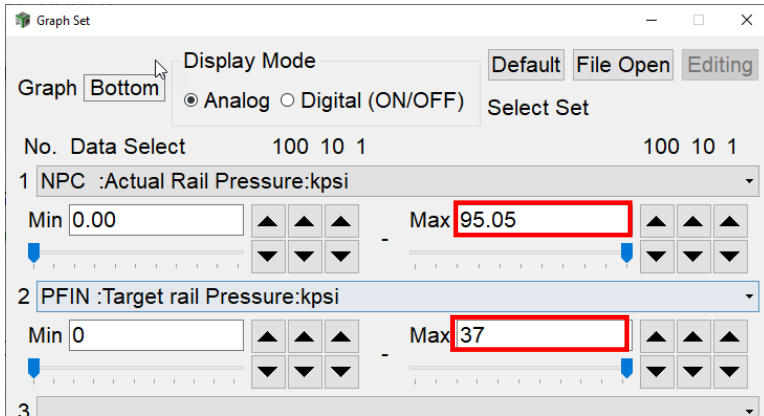
**Current**

<b>Pump Current</b>	0–1800	mA
---------------------	--------	----

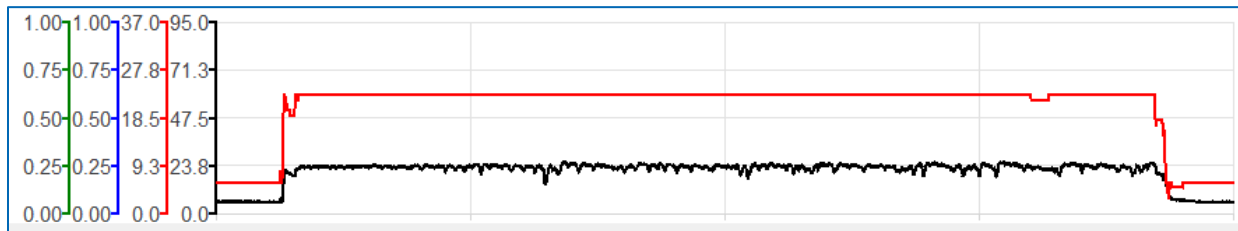
<b>Engine Rpm</b>	0–3300	RPM
-------------------	--------	-----



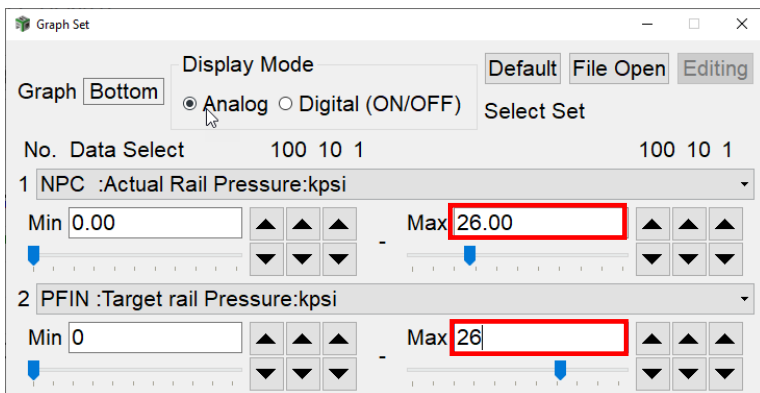
When graphing a target value versus an actual value, such as rail pressure or pump current, your **Min** and **Max** values must be the same for both parameters, or your graph will be skewed and not look correct. When measuring the actual and target rail pressure, these are the Yanmar default values:



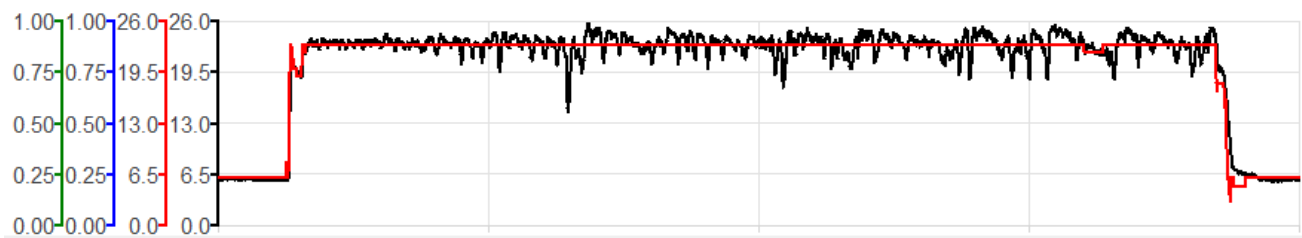
This is what the graph looks like below. Because the **Max** values are different, it appears the actual rail pressure (black) does not meet the Target rail pressure (red):



Changing the **Max** value to 26 kpsi, which is the rail pressure relief setting.

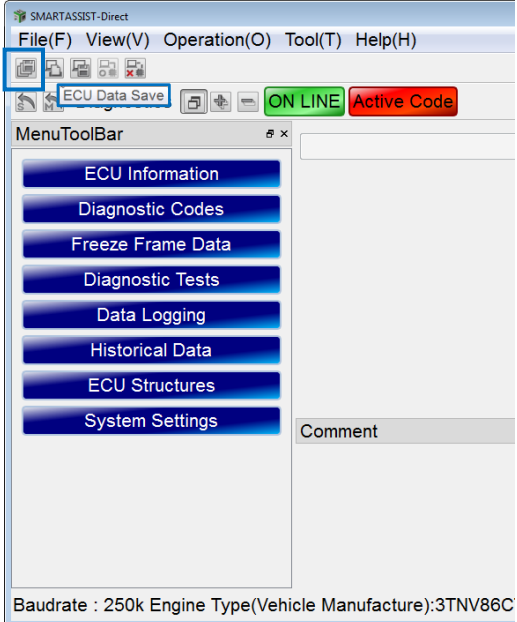
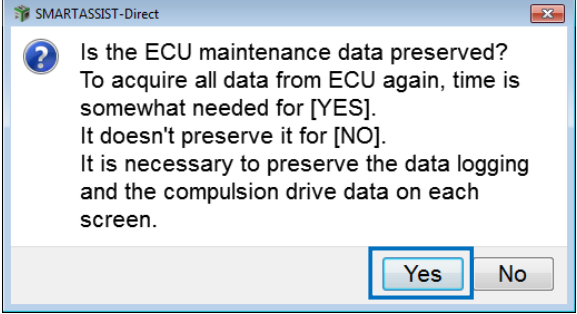
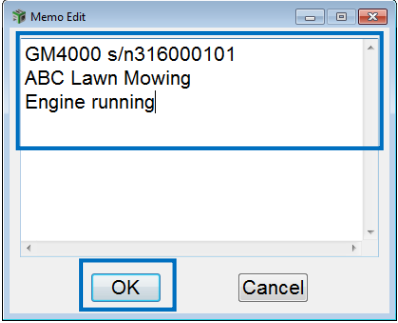


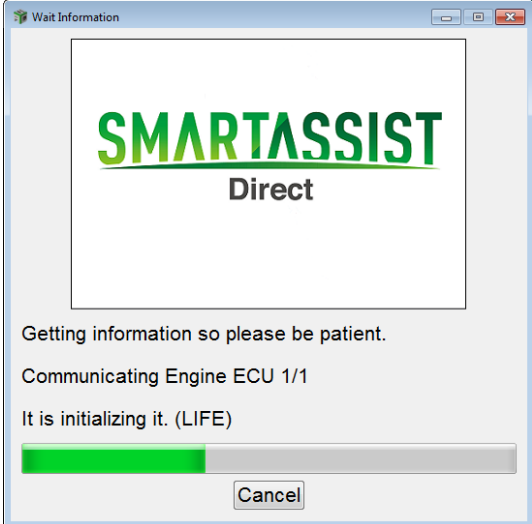
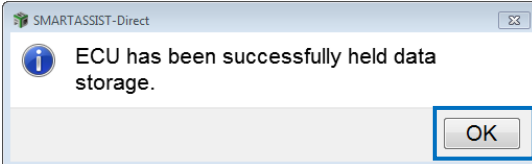
The trend graph now takes on a completely different meaning. The Actual Rail pressure (black) is trying to meet Target rail pressure (red); however, it shows that there is variation in the Actual pressure.



## ECU Data Save

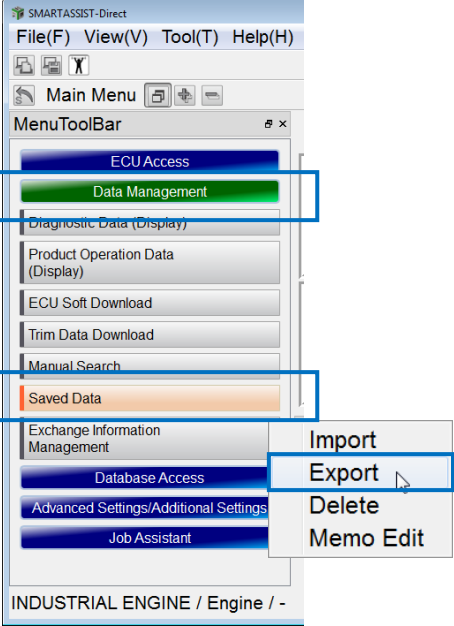
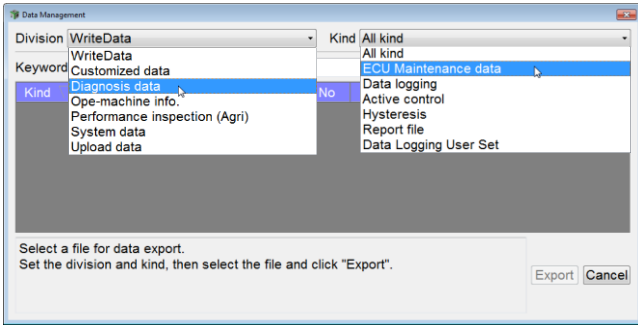
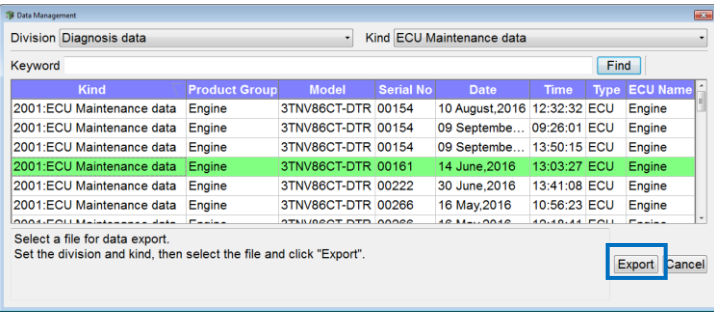
An ECU Data Save can be done with key on/engine off, or with the engine running. It depends on the issue you are having, whether to save the file with the engine running or not.

<p>1. To save a file, click <b>ECU Data Save</b> located in the upper left-hand corner of the screen.</p>	
<p>2. From this window, a confirmation message appears asking if you want to save the file:  a. To save, click <b>Yes</b>.</p>	
<p>3. In the <b>Memo Edit</b> window:  a. Enter the following information:  i. Machine model number  ii. Serial number  iii. Customer name  iv. Comments (i.e. If the engine is running or not).  b. Click <b>OK</b>.</p>	

<p>4. SmartAssist is now connecting to the ECU and saving the engine information.</p>	
<p>5. When the ECU has been successfully held into data storage: a. Click <b>OK</b>.</p>	
<p>The ECU Data File is now saved in the SmartAssist application. Next, it will need to be exported from SmartAssist to your computer desktop, so it can be emailed. See the Exporting Data File section on page <a href="#">50</a>.</p>	

## Exporting Data File

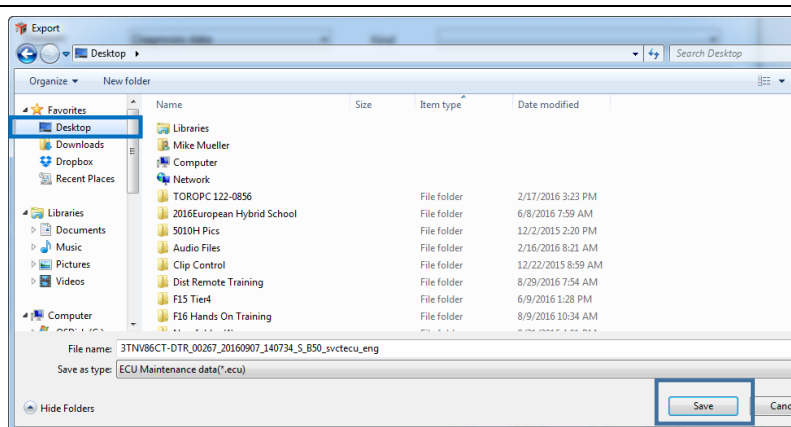
To export saved data files, follow the steps below.

<ol style="list-style-type: none"> <li>1. From the <b>Main Menu</b>:             <ol style="list-style-type: none"> <li>a. Click <b>Data Management</b>.</li> <li>b. Click <b>Saved Data</b>.</li> <li>c. From the <b>Saved Data</b> list:                 <ol style="list-style-type: none"> <li>i. Click <b>Export</b>.</li> </ol> </li> </ol> </li> </ol>																																																									
<ol style="list-style-type: none"> <li>2. From the Data Management window:             <ol style="list-style-type: none"> <li>a. Click the <b>Division</b> dropdown arrow:                 <ol style="list-style-type: none"> <li>i. Click <b>Diagnosis data</b>.</li> </ol> </li> <li>b. Click the <b>Kind</b> dropdown arrow:                 <ol style="list-style-type: none"> <li>i. Click <b>ECU Maintenance data</b>.</li> </ol> </li> </ol> </li> </ol>																																																									
<ol style="list-style-type: none"> <li>3. Click the file you wish to export. (highlights green):             <ol style="list-style-type: none"> <li>a. Click <b>Export</b>.</li> </ol> </li> </ol>	 <table border="1" data-bbox="805 1465 1498 1612"> <thead> <tr> <th>Kind</th> <th>Product Group</th> <th>Model</th> <th>Serial No</th> <th>Date</th> <th>Time</th> <th>Type</th> <th>ECU Name</th> </tr> </thead> <tbody> <tr> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00154</td> <td>10 August,2016</td> <td>12:32:32</td> <td>ECU</td> <td>Engine</td> </tr> <tr> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00154</td> <td>09 Septembe...</td> <td>09:26:01</td> <td>ECU</td> <td>Engine</td> </tr> <tr> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00154</td> <td>09 Septembe...</td> <td>13:50:15</td> <td>ECU</td> <td>Engine</td> </tr> <tr style="background-color: #e0ffe0;"> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00161</td> <td>14 June,2016</td> <td>13:03:27</td> <td>ECU</td> <td>Engine</td> </tr> <tr> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00222</td> <td>30 June,2016</td> <td>13:41:08</td> <td>ECU</td> <td>Engine</td> </tr> <tr> <td>2001:ECU Maintenance data</td> <td>Engine</td> <td>3TNV86CT-DTR</td> <td>00266</td> <td>16 May,2016</td> <td>10:56:23</td> <td>ECU</td> <td>Engine</td> </tr> </tbody> </table>	Kind	Product Group	Model	Serial No	Date	Time	Type	ECU Name	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00154	10 August,2016	12:32:32	ECU	Engine	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00154	09 Septembe...	09:26:01	ECU	Engine	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00154	09 Septembe...	13:50:15	ECU	Engine	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00161	14 June,2016	13:03:27	ECU	Engine	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00222	30 June,2016	13:41:08	ECU	Engine	2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00266	16 May,2016	10:56:23	ECU	Engine
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2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00154	09 Septembe...	09:26:01	ECU	Engine																																																		
2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00154	09 Septembe...	13:50:15	ECU	Engine																																																		
2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00161	14 June,2016	13:03:27	ECU	Engine																																																		
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2001:ECU Maintenance data	Engine	3TNV86CT-DTR	00266	16 May,2016	10:56:23	ECU	Engine																																																		

4. Select the location where you want the file to be saved.

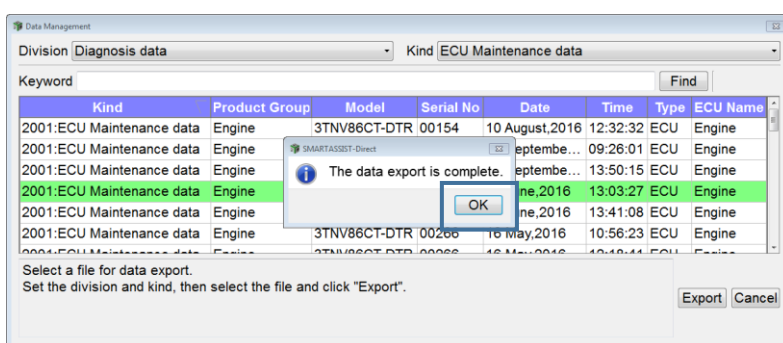
**Note:** Your desktop is a good place to save it to. The file name is automatically populated with the engine model and serial number.

- a. Click **Desktop**.
- b. Click **Save**.



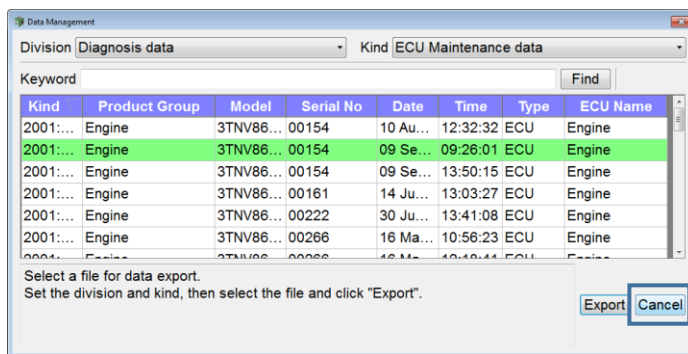
5. From the **Data Management** window, a message is displayed when the data export is complete:

- a. Click **OK**.



6. From the **Data Management** window:

- a. Click **Cancel**.



Now you are at the **Main Menu** and can find the file on your desktop and attach it to an email and send it.