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## **I. INTRODUCTION**

### **1. SOFTWARE OVERVIEW**

The International electronically controlled engines have a wide range of failsafe diagnostic capabilities. To properly diagnose these failures please follow the instructions outlined in this and other International manuals.

The MasterDiagnostics software provides the capabilities to

- 1) Read and display numerous electronic engine parameters in both graphical and textual format.
- 2) Read and display electronic engine control system trouble codes.
- 3) Read and display electronic engine controller ID information.
- 4) Read and display electronic engine controller programmable parameters.
- 5) Provide detailed diagnostic information on specific trouble code service.
- 6) Read and display J1708 (ATA) sources currently active on the data link.
- 7) Provide snapshot capability.
- 8) Provide a mechanism to play back snapshot recordings.
- 9) Provide a mechanism to change engine controller programmable parameter.

## **2. SYSTEM REQUIREMENTS**

The MasterDiagnostics software is designed and developed to provide diagnosis to the fine line of International engines.

System requirements are as follows:


- 1) PC with Pentium® or Pentium® equivalent or replacement CPU.  
32MB of system RAM.  
30MB of free system HD.  
CD-ROM drive.
- 2) Microsoft Windows® Operating System. Depends on the version of the MasterDiagnostics software.
- 3) International MasterDiagnostics software.
- 4) International approved truck J1708 (ATA) to PC Interface cable.

### 3. NOMENCLATURE

The following are the nomenclatures used within this manual. Please read this section carefully and understand the meaning of the actions required.

|                                 |  |
|---------------------------------|--|
| MD                              | MASTERDIAGNOSTICS Software.  |
| Click or Clicking               | For EZ-Tech users this indicates tapping on the lower left-hand area of the touch pad once. For PC users this indicates tapping on the left mouse button.                                    |
| Double click or Double clicking | For EZ-Tech users this indicates tapping on the lower left-hand area of the touch pad twice in succession. For PC users this indicates tapping on the left mouse button twice in succession. |
| Right Click                     | For EZ-Tech users this indicates tapping on the upper left-hand area of the touch pad once. For PC users this indicates tapping on the right mouse button.                                   |
| Click and drag                  | For EZ-Tech users this indicates tapping on the lower left-hand area of the touch pad marked by a lock symbol and then using the main area of the touch pad to move the mouse pointer.       |
| Hit                             | Indicates depressing and then releasing a key on the keyboard.   |
| ALT                             | Indicates the action whereby the “Alt” key on the keyboard is depressed while another key on the keyboard is hit.  |

## Scroll bar

The horizontal-scroll bar  is normally at the bottom of the window. Click on the left arrow button to scroll left. Click on the right arrow button to scroll right. Click on the area to the left of the slider to page left. Click on the area to the right of the slider to page right. Or simply use the slider by clicking and dragging.

The vertical-scroll bar is normally at the right of the window. Click on the up arrow button to scroll up. Click on the down arrow button to scroll down. Click on the area to the top of the slider to page up. Click on the area to the bottom of the slider to page down. Or simply use the slider by clicking and dragging.



## II. INSTALLATION

### 1. SYSTEM SETUP AND SOFTWARE INSTALLATION

It is easy to set up International MasterDiagnostics (MD) software. Simply follow the steps on your PC screen.

Following are some of the frequently asked questions during the software installation.

- 1) **Using CD.** Insert CD into CD-ROM drive. If Windows® does not automatically start to setup the software, then refer to Section III-13 System and Software Trouble Shooting.
- 2) Always follow the setup instruction on the screen. If you are unsure of the proper responses to any questions during the install process, please select the default values assigned by the install process.
- 3) When the setup installation has been successfully installed, the MasterDiagnostics icon should be embedded in the **VEHICLE DIAGNOSTIC** folder. Double click on the **VEHICLE DIAGNOSTIC** folder to bring up the MasterDiagnostics software shortcut icon.

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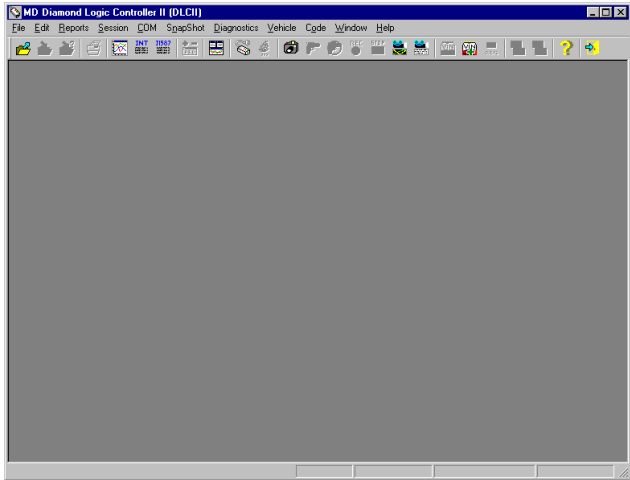


### III. HOW TO USE THE MASTERDIAGNOSTICS SOFTWARE

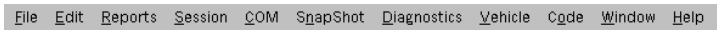
#### 1. BASICS

To begin using the MasterDiagnostics (MD) software please, spend a few minutes reading through this section to gain the basics behind the software.

After launching the MasterDiagnostics software, your computer should display the following main window.



The software provides a menu bar that is right below the window's title bar. All available features of the software can be accessed via the menu bar.



For the frequently used actions, a tool bar is provided. The tool bar provides a quick and easy way to access the important features of this software. Each tool bar button will be described briefly below.



#### File => Open



Opens a new or existing graphical or textual display file. Using this option allows the user to recall and view a previously saved configuration. Three display formats are available: \*.ntv (a text display for the International engines), \*.jtv (a text display for generic J1587 ATA data link engines), and \*.pgv (a graphical display).

**File => Save**



Saves the configuration of the highlighted window.

**File => Save As**



Saves the configuration of the highlighted window and prompts the user for a file name.

**File => Print**



Prints the highlighted window to the printer or a file. Not all windows may be printed.

**File => New**



Opens a new graphical display window.

**File => New**



Opens a new International textual display window.

**File => New**



Opens a new J1587 ATA textual display window.

**Edit => Add/Delete/Edit**



Adds, deletes or edits parameters from the highlighted window.

**Session => Open**



Retrieves a previously set up MasterDiagnostics desktop workspace.

**COM => Open**



Begins J1708 (ATA) communication via the interface cable.

**COM => Sniffer**



Displays the sources of any active device on the J1708 (ATA) communication data link.

**Snapshot => Setup**



Sets up the snapshot recording options: the trigger source, pre-trigger recording time, post-trigger recording time, which parameters to record, how often to take snapshot, etc.

**Snapshot => Arm**



Arms the trigger for the snapshot.

**Snapshot => Disarm**

Disarms the trigger for the snapshot.



**Snapshot => Start**

Manually starts the snapshot recording. The F2 key has the same function.



**Snapshot => Stop**

Manually stops the snapshot recording. The F3 key has the same function.



**Snapshot => Replay**

Replays a snapshot recording file in a graphical format.



**Snapshot => Replay**

Replays a snapshot recording file in a textual format.



**Vehicle => View Information**

Opens the electronic engine controller module identification window.



**Vehicle => View Information**

Opens the electronic engine controller module identification session hot link windows.



**Vehicle => Program**

Opens an electronic engine controller module programming window.



**Code => View**

Opens the trouble code window.



**Code => Clear**

Clears the trouble codes contained in the EECM.



**Help => Contents**

Opens the MasterDiagnostics software on-line help.



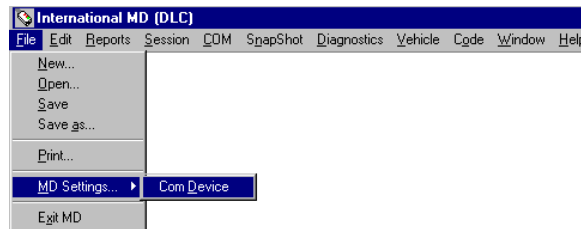
**File => Exit**

Exits and terminates the MasterDiagnostics software.

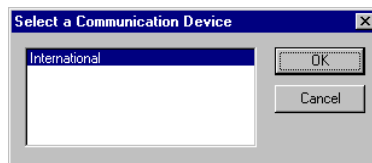



## SETUP INTERFACE CABLE

Prior to starting, the software configuration must be set properly. Click on **File** in the menu bar and then **MD Settings**. There are two settings available: **Com Device**, and **Exit Mode**.



The **Com Device** selection configures which interface cable is connected to the communication port. This is based on the TMC RP1210A interface document, whereby the user is requested to select a cable manufacturer's RP1210A DLL first (DLL is a software supplied by the interface cable manufacturer).



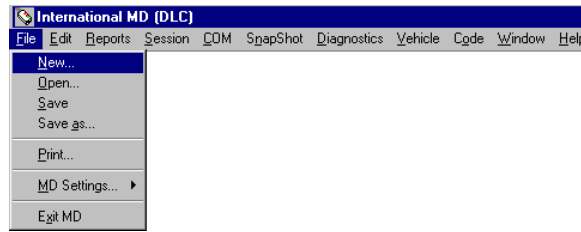
Once a communication DLL is selected, click on . The user is prompted to select the actual communication device based on the selected DLL. The communication device selection involves how the cable is connected to the PC. This may be a Com Port selection, a Parallel Port selection, USB selection, etc.



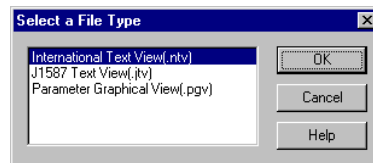
## 2. DATA IN TEXTUAL FORMAT

To monitor engine parameter data in textual format you must first create a text window.

Selecting **File** and then **New** in the menu bar or press ALT “F” and then “N” will open the **Select a File Type** dialog box.



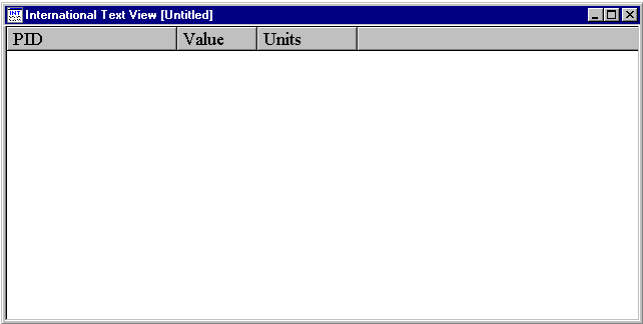
Select **International Text View (.ntv)** as the desired type and click on



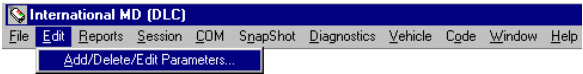
HINT: Toolbar shortcut is by clicking on



A generic text view display window will appear and it will have no parameters in it. Text view windows consist of three columns: **PID**, **Value**, and **Units**. The PID column shows the PID description or acronym. The Value column shows the current data value. The Units column shows the display value units, which may be English or Metric.



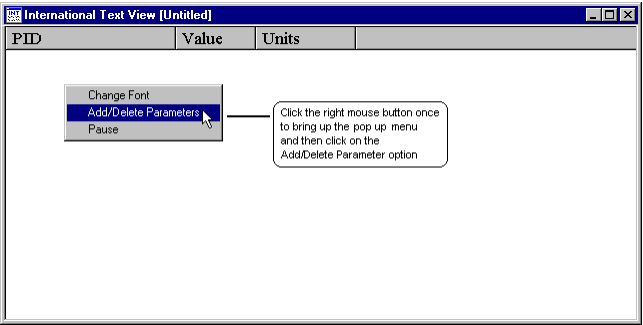
Add parameters to this window to display any data. Select **Edit** and then **Add/Delete/Edit Parameters** on the menu bar



HINT: Toolbar shortcut is by clicking on

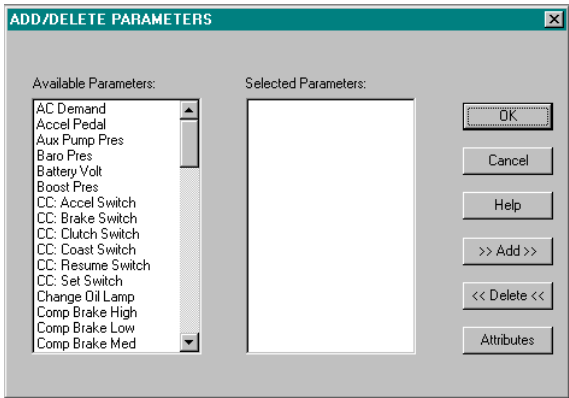



Another method to add parameters is via the pop up menu. Place the mouse pointer inside the text view window and right click once to bring up a pop up menu associated with this window type. In this pop up menu there are three options: **Change Font**, **Add/Delete Parameters**, and **Pause**. Click on the **Add/Delete Parameter** option.

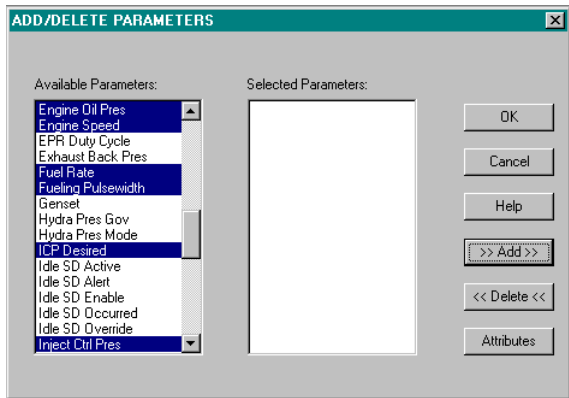




Any of the three methods will cause the **ADD/DELETE PARAMETERS** dialog box to appear.





Double clicking on the parameter or clicking on all the desired parameters in the **Available Parameter** list box and then clicking on  to add parameters.

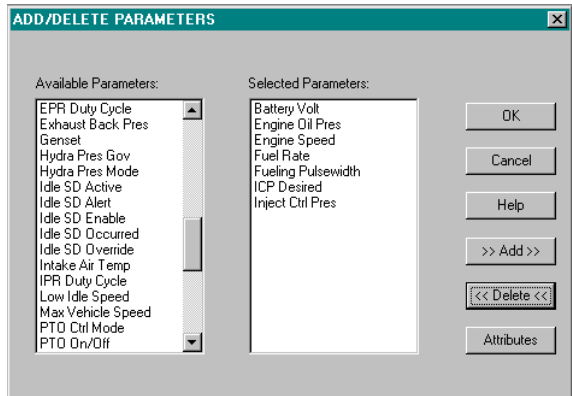



The order in which the PIDs are displayed in the text view window is dependent on when a parameter is added to the Selected Parameter list. For example, if you double click “Fueling Pulsewidth” first and then “Fuel Rate”, then Fueling Pulsewidth will be displayed on top of “Fuel Rate” in the text view window.

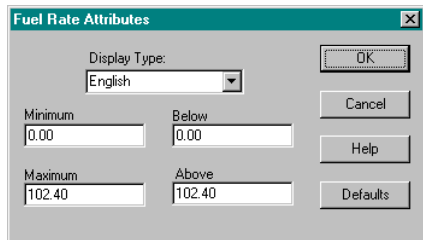
Use the vertical scroll bar to bring up the remaining parameters.


The selected parameters will appear in the **Selected Parameter** list box.


Double clicking on a parameter from the **Selected Parameter** list will remove it from the text view window. The other way to remove parameters is to select all the parameters in the **Selected Parameter** list box, click on  and then click on 




The default display unit for the parameter is in English units. To change to Metric display units, select the parameter in the **Selected Parameter** list box by clicking it and then click on  which opens the associated attribute dialog box.

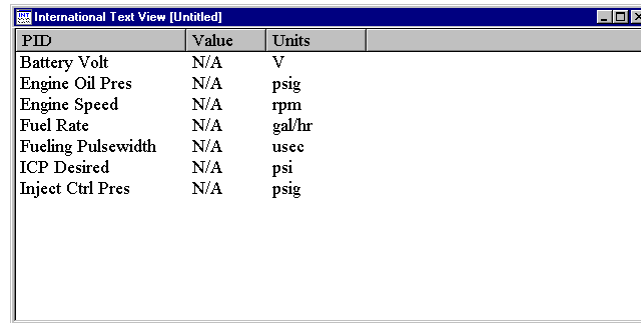


Change the displayed units by clicking on the down arrow next to the **Display Type** edit box. When complete, click on 

If you need to recall the original settings you may click on  to restore the attributes to the factory defaults.

When finished with adding or deleting parameters and modifying the attributes, click on  in the **ADD/DELETE PARAMETERS** dialog box.

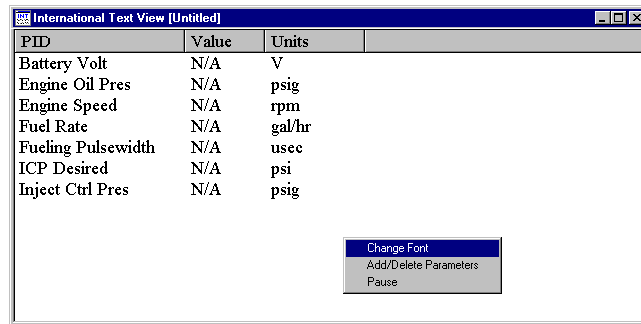
The text window will display the selected parameters.



The screenshot shows a window titled "International Text View [Untitled]". Inside, there is a table with three columns: PID, Value, and Units. The table contains the following data:

| PID                | Value | Units  |
|--------------------|-------|--------|
| Battery Volt       | N/A   | V      |
| Engine Oil Pres    | N/A   | psig   |
| Engine Speed       | N/A   | rpm    |
| Fuel Rate          | N/A   | gal/hr |
| Fueling Pulsewidth | N/A   | usec   |
| ICP Desired        | N/A   | psi    |
| Inject Ctrl Pres   | N/A   | psig   |

Placing the mouse pointer within the window and right clicking once will bring up advanced features. Click on **Change Font** option to modify the display font type and size.



The screenshot shows the same "International Text View [Untitled]" window as before, but with a right-click context menu open in the bottom right corner. The menu has three options: "Change Font" (highlighted in blue), "Add/Delete Parameters", and "Pause". The table of parameters remains visible in the background.

| PID                | Value | Units  |
|--------------------|-------|--------|
| Battery Volt       | N/A   | V      |
| Engine Oil Pres    | N/A   | psig   |
| Engine Speed       | N/A   | rpm    |
| Fuel Rate          | N/A   | gal/hr |
| Fueling Pulsewidth | N/A   | usec   |
| ICP Desired        | N/A   | psi    |
| Inject Ctrl Pres   | N/A   | psig   |

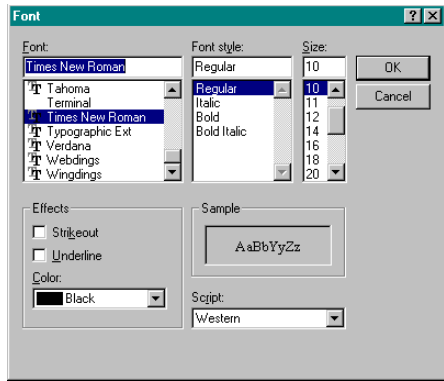
Change Font

Add/Delete Parameters

Pause

Select the desired options in the **FONT** dialog box and click on

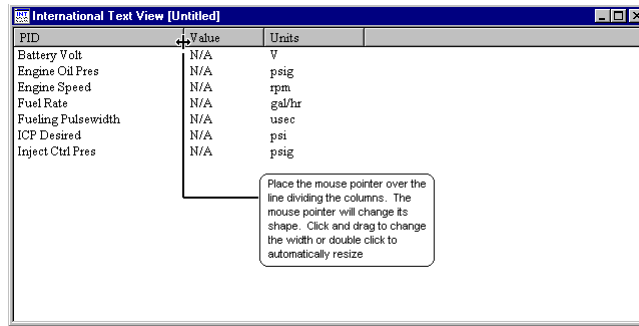
OK



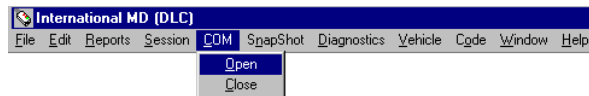
Now the text window should change to the selected font type and size.

| International Text View [Untitled] |       |        |  |
|------------------------------------|-------|--------|--|
| PID                                | Value | Units  |  |
| Battery Volt                       | N/A   | V      |  |
| Engine Oil Pres                    | N/A   | psig   |  |
| Engine Speed                       | N/A   | rpm    |  |
| Fuel Rate                          | N/A   | gal/hr |  |
| Fueling Pulsewidth                 | N/A   | usec   |  |
| ICP Desired                        | N/A   | psi    |  |
| Inject Ctrl Pres                   | N/A   | psig   |  |

Often, it is necessary to re-size some of the columns in the text window. Move the mouse pointer to the line between the columns in the heading bar. The mouse pointer will change from an arrow to a bar with arrows on the left and right sides. Click and drag to resize the width of the column or double clicking at this point will cause the column to be automatically re-sized to fit the widest entry in the column.



This text view window is configured and ready to be used. Opening the COM at this time will allow the data to be displayed. To start monitoring the ATA bus, click on **COM** in the menu bar and then click on **Open**



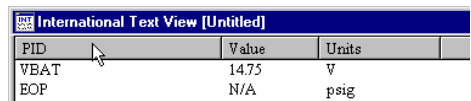
HINT: Toolbar shortcut is by clicking on



International Text View [Untitled]

| PID                | Value  | Units  |
|--------------------|--------|--------|
| Battery Volt       | 14.75  | V      |
| Engine Oil Pres    | N/A    | psig   |
| Engine Speed       | 0.00   | rpm    |
| Fuel Rate          | 0.00   | gal/hr |
| Fueling Pulsewidth | 0.00   | usec   |
| ICP Desired        | 724.99 | psi    |
| Inject Ctrl Pres   | N/A    | psig   |

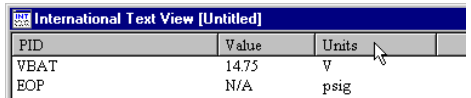
The information in the window may be displayed in different formats by clicking on the title of the column. By clicking on **PID**, the descriptions are toggled to acronyms.



The screenshot shows a window titled "International Text View [Untitled]". It contains a table with three columns: PID, Value, and Units. The "PID" column header is highlighted with a mouse cursor. The table data is as follows:

| PID  | Value | Units |
|------|-------|-------|
| VBAT | 14.75 | V     |
| EOP  | N/A   | psig  |

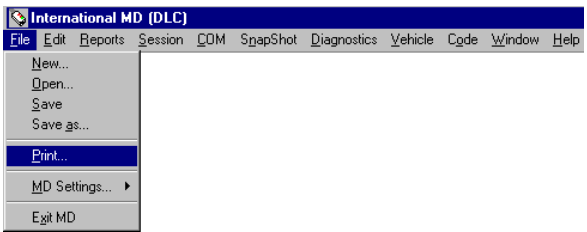
By clicking on **Units**, the units of all of the display parameters are toggled between Metric and English.



The screenshot shows the same "International Text View [Untitled]" window. The "Units" column header is now highlighted with a mouse cursor. The table data remains the same:

| PID  | Value | Units |
|------|-------|-------|
| VBAT | 14.75 | V     |
| EOP  | N/A   | psig  |

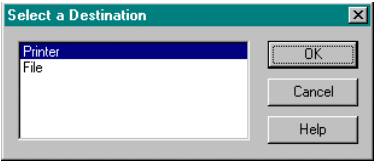
The information in these text view windows may be printed. Select **File** and then **Print...** in the menu bar



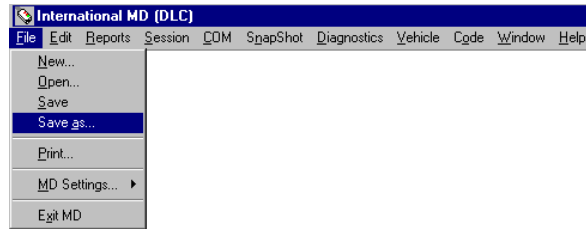
HINT: Toolbar shortcut is by clicking on



You may send the printout to the printer or to a file.



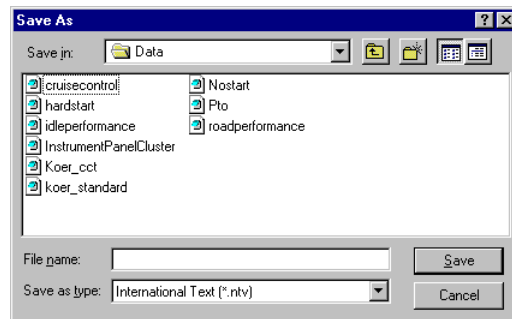
The configuration of these text windows may be saved for later retrieval. Please be aware that the list of displayed parameters and the font size and type information are saved. The actual parameter data is not included as part of the configuration. Select **File** and then **Save As...** in the menu bar.



HINT: Toolbar shortcut is by clicking on



The save file dialog box will appear.



Simply type in the file name inside the **File name** edit box and click on

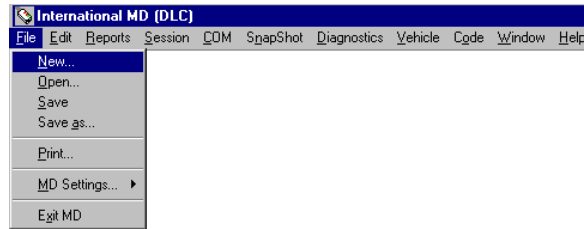



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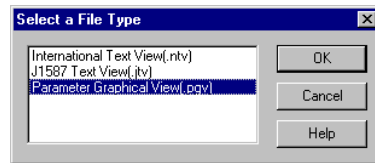


### 3. DATA IN GRAPHICAL FORMAT

To monitor the engine parameter data in graphical format, you must first create a graphical window. This is done similarly to the creation of a text view window. Selecting **File** and then **New** in the menu bar or pressing ALT “F” and then “N” will open the **Select a File Type** dialog box.



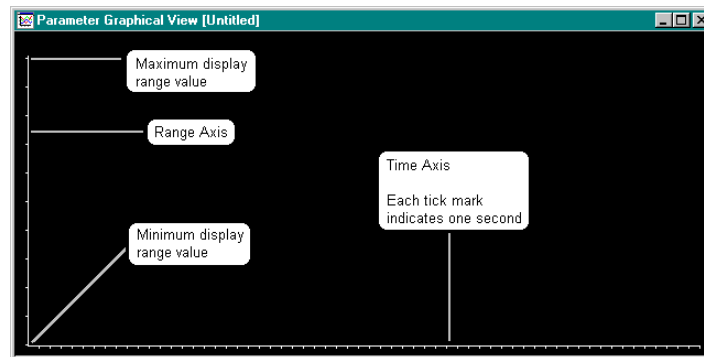
Select **Parameter Graphical View (.pgv)** as the desired type to open and click on 



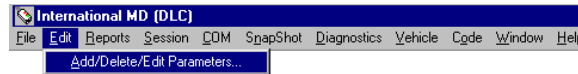
HINT: Toolbar shortcut is by clicking on 



A generic graphical display window will appear and it will have no parameters in it. It should only display the time axis and the range axis.



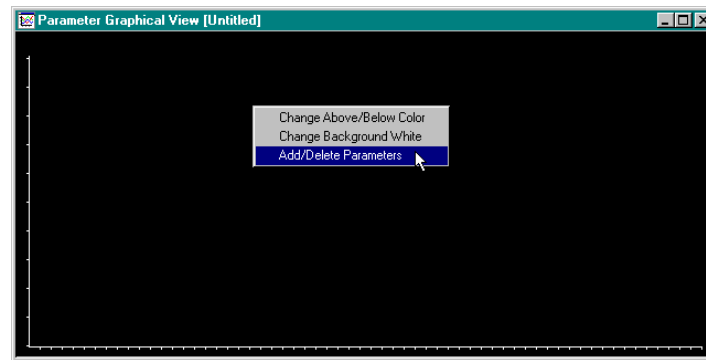
To add parameters in it, select **Edit** and then **Add/Delete/Edit Parameters** on the menu bar



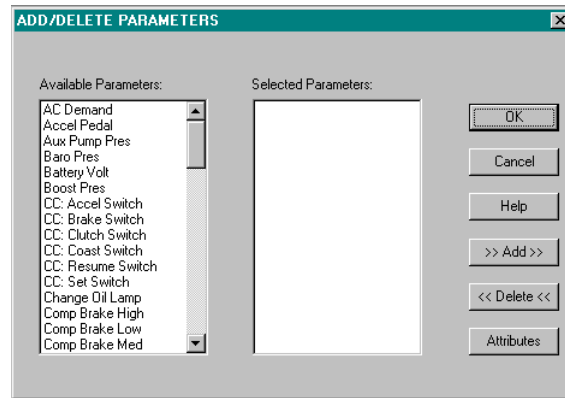
HINT: Toolbar shortcut is by clicking on




Another method to add parameters is via the pop up menu. Place the mouse pointer inside the graphical view display window and right click once to bring up a pop up menu, associated with this window type. In the pop up menu there are three options: **Change Above/Below Color**, **Change Background White**, and **Add/Delete Parameters**. Click on the **Add/Delete Parameter** option.

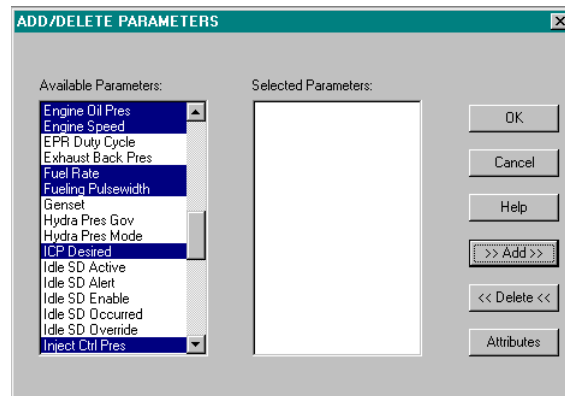


The **ADD/DELETE PARAMETERS** dialog box should appear.

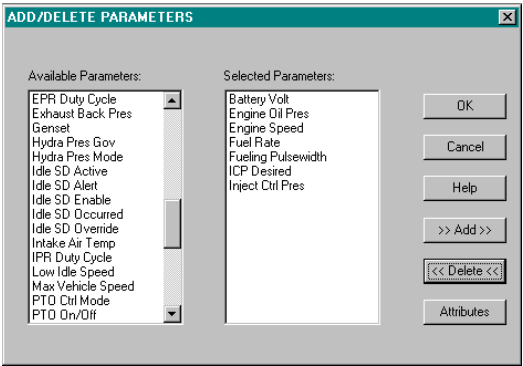


Double clicking on the parameter or click on all the desired parameters in the **Available Parameter** list box and then click on  to add the parameters.

Use the vertical scroll bar to bring up the remaining parameters.

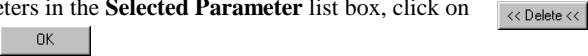


The order in which the PIDs are displayed in the graphical view window is dependent on when a parameter is added to the **Selected Parameter** list. For example, if you double click “Fueling Pulsewidth” first and then “Fuel Rate”, Fueling Pulsewidth will be displayed to the left of “Fuel Rate”



At this point, the selected parameters should appear in the **Selected Parameter** list box.

Double clicking on a parameter from the **Selected Parameters** list will remove it from the graphical view window. The other way to remove parameters is to select all the parameters in the **Selected Parameter** list box, click on



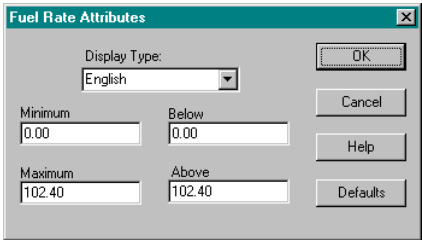
and then click on




Select the parameter in the **Selected Parameter** list box by clicking it and then click on



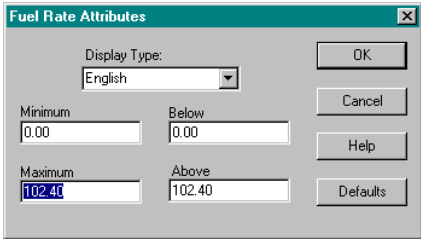
to open the associated attribute dialog box.



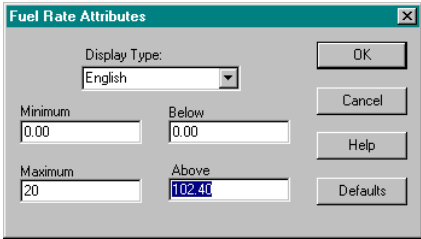
Change the displayed units by clicking on the down arrow next to the **Display Type** edit box and selecting the desired type.

Change the **Minimum** and **Maximum** display range by replacing the values in the respective edit boxes. The minimum and maximum values are used to re-scale the graph. The **Below** and **Above** values cause the color of the line for that PID to change color when the parameter is below or above them. Modify the minimum and maximum display ranges first before changing the above and below values. Double clicking on the value will cause the value to be highlighted, which allows you to type over it. When complete, click on 

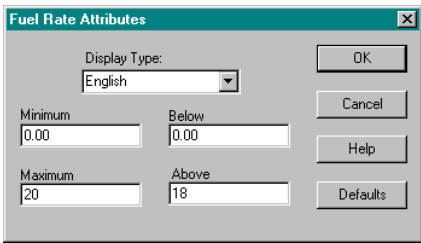
In the following example, changing the maximum display range to 20 and the above value to 18 causes the “Fuel Rate” data to be re-scaled, and when Fuel Rate has a value greater than 18, its display color will change.




The dialog box titled "Fuel Rate Attributes" has a "Display Type" dropdown set to "English". It contains four input fields: "Minimum" (0.00), "Below" (0.00), "Maximum" (102.40), and "Above" (102.40). The "Maximum" and "Above" fields are highlighted with a blue selection box. On the right side, there are buttons for "OK", "Cancel", "Help", and "Defaults".



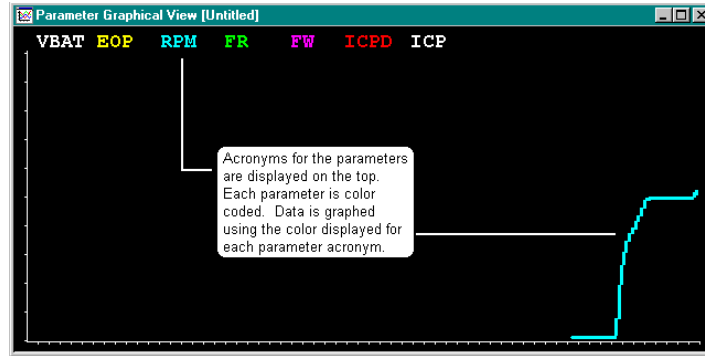
The dialog box titled "Fuel Rate Attributes" has a "Display Type" dropdown set to "English". It contains four input fields: "Minimum" (0.00), "Below" (0.00), "Maximum" (20), and "Above" (102.40). The "Above" field is highlighted with a blue selection box. On the right side, there are buttons for "OK", "Cancel", "Help", and "Defaults".



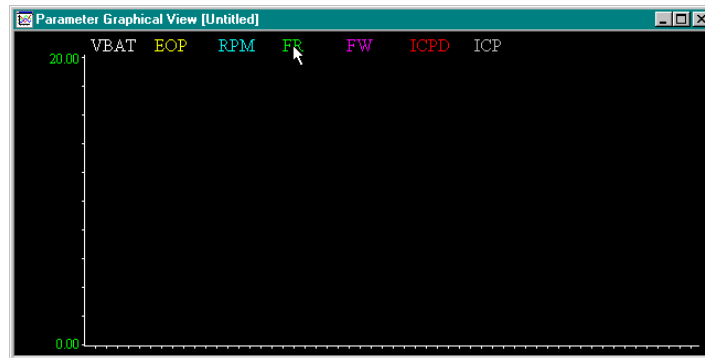
The dialog box titled "Fuel Rate Attributes" has a "Display Type" dropdown set to "English". It contains four input fields: "Minimum" (0.00), "Below" (0.00), "Maximum" (20), and "Above" (18). On the right side, there are buttons for "OK", "Cancel", "Help", and "Defaults".

If you need to recall the original settings, you may click on  to restore the attributes to the factory defaults.

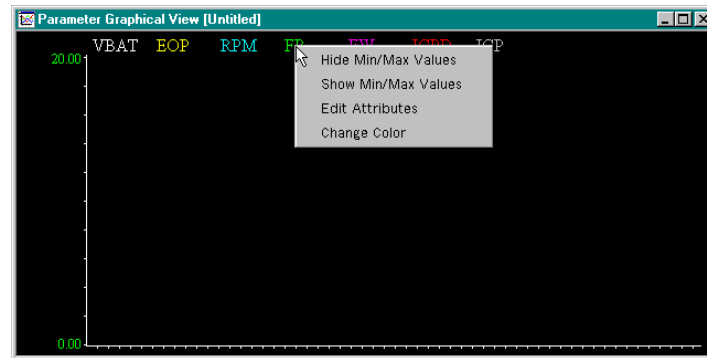
The graphical window will now display the selected parameters using their acronyms. MD pre-selects different colors for each parameter in the order they are added to the window. Use a text view window to find the full description for these parameters (please see section III.2).



Clicking on the parameter acronyms at the top of the graph will cause the graph to display the minimum and the maximum display range values on the left scale. For this example, the "Fuel Rate" maximum display range has been changed to 20.

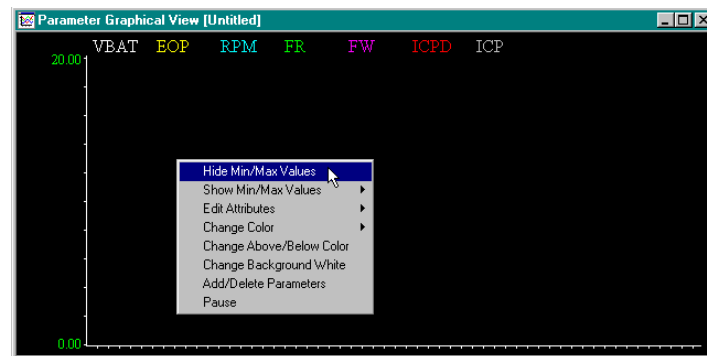


Right clicking on an acronym will cause a pop up menu to appear. Several options are available in this pop up menu: **Hide Min/Max Values** (available only when the values are displayed), **Show Min/Max Values**, **Edit Attributes**, and **Change Color**. All these options are associated with the selected parameter only.

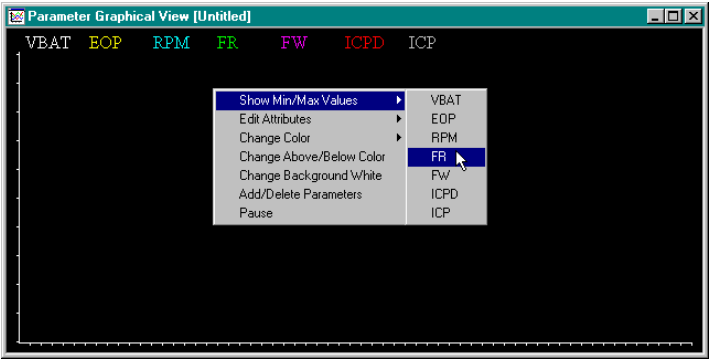


Right clicking anywhere else inside the graphical window will cause another pop up menu to appear. Several options are available in this pop up menu: **Hide Min/Max Values** (available only when the values are displayed), **Show Min/Max Values**, **Edit Attributes**, **Change Color**, **Change Above/Below Color**, **Change Background White** (or **Change Background Black** depending which is the current background color), **Add/Delete Parameters**, and **Pause**. All these options are associated with the entire graphical window.

By clicking on the **Hide Min/Max Values** option, the range values displayed on the left axis are hidden from view.



To redisplay the range values you may also use the **Show Min/Max Values** option.

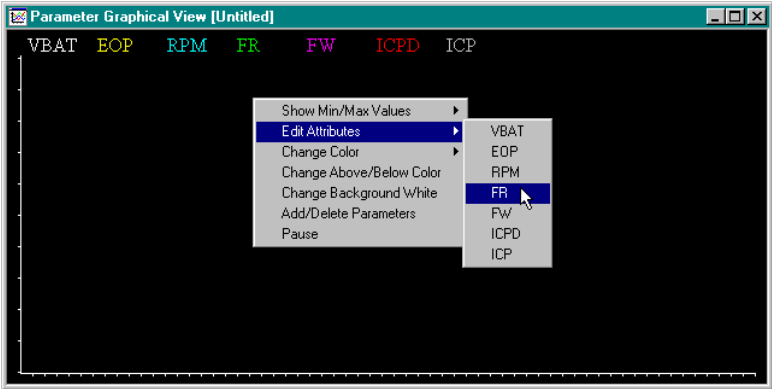


If the range values are displayed, then right clicking over the range values and then clicking on the **Hide** option causes the range values to be hidden.

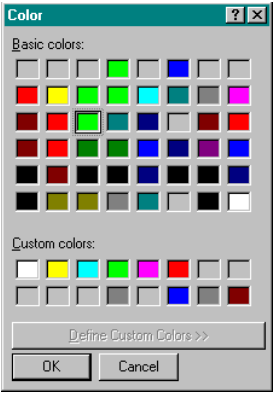




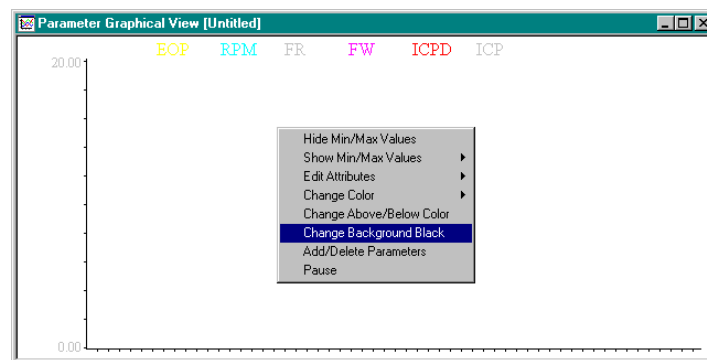
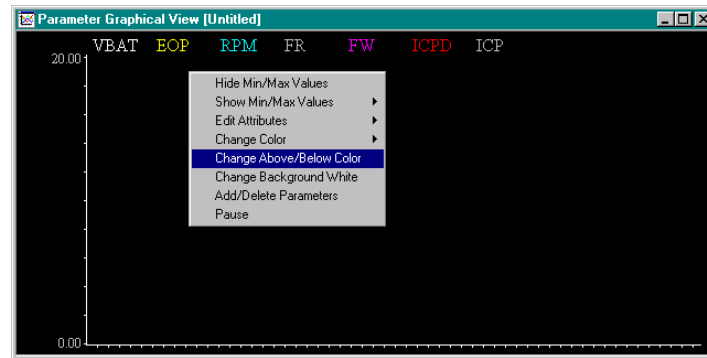
A list of all the selected parameter acronyms will appear by clicking on an option that has a right arrow. This will allow the change to be effective on the selected parameter. By clicking on the **Edit Attributes** option, you may modify the display attributes for that parameter.



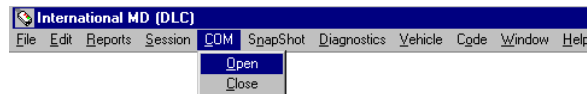
By clicking on the **Change Color** option, the color palette will pop up allowing you to select a new color. Simply click on the color of your choice and then click on



It is often necessary to change the background color when viewing the graph to get the best contrast. Click on **Change Background Color White** to change the background color. When the background color is white, the option will automatically change to **Change Background Color Black**.



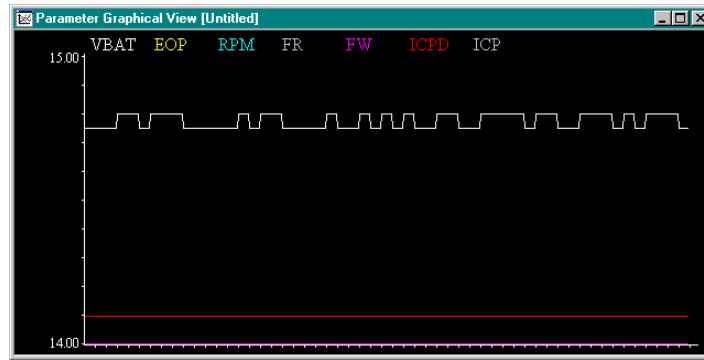
This graphical window is now configured and is ready to display the data. Click on **COM** in the menu bar and then **Open** to start monitoring the ATA bus.



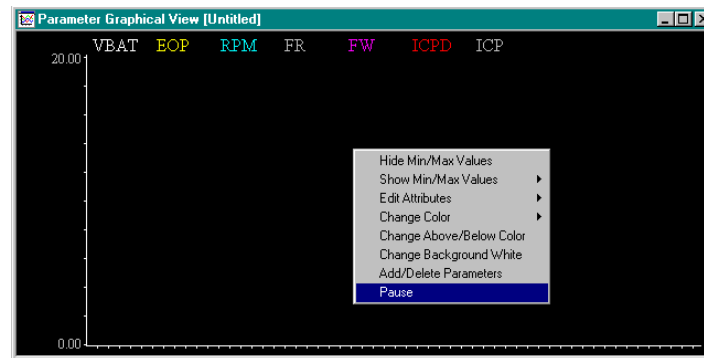
HINT: Toolbar shortcut is by clicking on



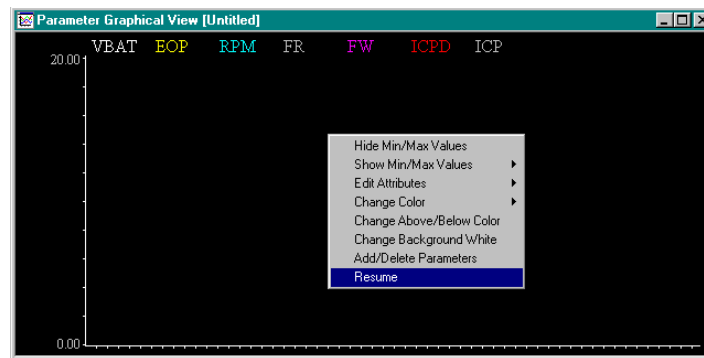
The most recent data is displayed on the right and the older data are automatically scrolled to the left.



Select the **Pause** option in the drop down menu to stop the graph from scrolling



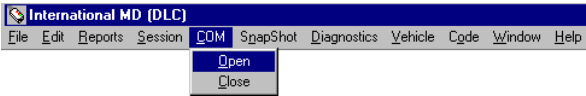
To start collecting data again, simply select the **Resume** option in the pop up menu. The data while "paused" are not retained. When "resume" occurs, the latest data is then used.



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#### 4. TROUBLE CODES

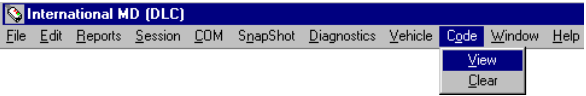
The trouble codes can be displayed only after Key-On and ATA bus is opened. Selecting **COM** and then **Open** in the menu bar will open the ATA bus.



HINT: Toolbar shortcut is by clicking on



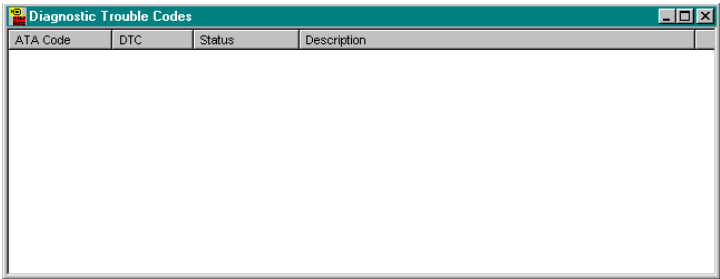
Selecting **Code** and then **View** option in the menu bar opens the Trouble Code window.



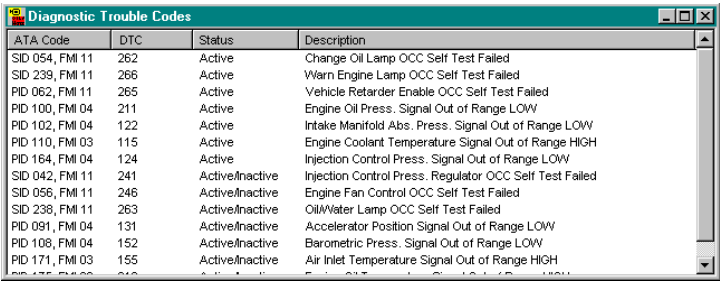
HINT: Toolbar shortcut is by clicking on



The **Diagnostic Trouble Codes** window will appear. The Trouble code window consists of 4 columns: **ATA Code**, **DTC**, **Status**, and **Description**. The **ATA Code** column displays the ATA trouble code numbering system. This displays the trouble code associated with a sub-system (SID) or a parameter (PID) and the failure mode indicator (FMI). The **DTC** column displays the International Diagnostic Trouble Code numbering system. The **Status** column displays the current status of the trouble code. The **Description** column displays a short description of the trouble code.

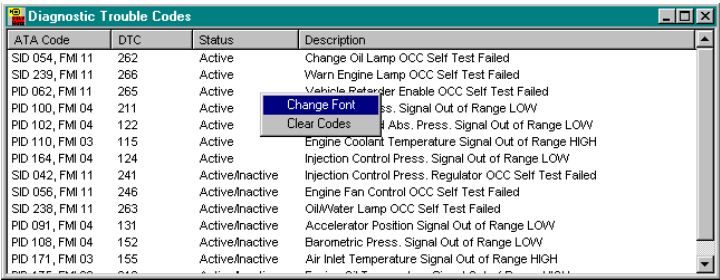


If the electronic engine control module has detected faults, the trouble codes are automatically displayed. An Up/Down scroll bar will automatically appear when there are too many trouble codes to be displayed in the window. Slide the scroll bar up and down to view all the trouble codes.



| ATA Code        | DTC | Status          | Description   |
|-----------------|-----|-----------------|---|
| SID 054, FMI 11 | 262 | Active          | Change Oil Lamp OCC Self Test Failed                    |
| SID 239, FMI 11 | 266 | Active          | Warn Engine Lamp OCC Self Test Failed                   |
| PID 062, FMI 11 | 265 | Active          | Vehicle Retarder Enable OCC Self Test Failed            |
| PID 100, FMI 04 | 211 | Active          | Engine Oil Press. Signal Out of Range LOW               |
| PID 102, FMI 04 | 122 | Active          | Intake Manifold Abs. Press. Signal Out of Range LOW     |
| PID 110, FMI 03 | 115 | Active          | Engine Coolant Temperature Signal Out of Range HIGH     |
| PID 164, FMI 04 | 124 | Active          | Injection Control Press. Signal Out of Range LOW        |
| SID 042, FMI 11 | 241 | Active/Inactive | Injection Control Press. Regulator OCC Self Test Failed |
| SID 056, FMI 11 | 246 | Active/Inactive | Engine Fan Control OCC Self Test Failed                 |
| SID 238, FMI 11 | 263 | Active/Inactive | Oil/Water Lamp OCC Self Test Failed                     |
| PID 091, FMI 04 | 131 | Active/Inactive | Accelerator Position Signal Out of Range LOW            |
| PID 108, FMI 04 | 152 | Active/Inactive | Barometric Press. Signal Out of Range LOW               |
| PID 171, FMI 03 | 155 | Active/Inactive | Air Inlet Temperature Signal Out of Range HIGH          |

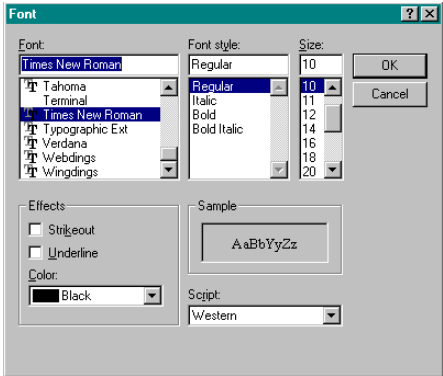
Placing the mouse pointer within the window and right click once will bring up advanced features. Click on the **Change Font** option to modify the display font type and size.



| ATA Code        | DTC | Status          | Description   |
|-----------------|-----|-----------------|---|
| SID 054, FMI 11 | 262 | Active          | Change Oil Lamp OCC Self Test Failed                    |
| SID 239, FMI 11 | 266 | Active          | Warn Engine Lamp OCC Self Test Failed                   |
| PID 062, FMI 11 | 265 | Active          | Vehicle Retarder Enable OCC Self Test Failed            |
| PID 100, FMI 04 | 211 | Active          | Engine Oil Press. Signal Out of Range LOW               |
| PID 102, FMI 04 | 122 | Active          | Intake Manifold Abs. Press. Signal Out of Range LOW     |
| PID 110, FMI 03 | 115 | Active          | Engine Coolant Temperature Signal Out of Range HIGH     |
| PID 164, FMI 04 | 124 | Active          | Injection Control Press. Signal Out of Range LOW        |
| SID 042, FMI 11 | 241 | Active/Inactive | Injection Control Press. Regulator OCC Self Test Failed |
| SID 056, FMI 11 | 246 | Active/Inactive | Engine Fan Control OCC Self Test Failed                 |
| SID 238, FMI 11 | 263 | Active/Inactive | Oil/Water Lamp OCC Self Test Failed                     |
| PID 091, FMI 04 | 131 | Active/Inactive | Accelerator Position Signal Out of Range LOW            |
| PID 108, FMI 04 | 152 | Active/Inactive | Barometric Press. Signal Out of Range LOW               |
| PID 171, FMI 03 | 155 | Active/Inactive | Air Inlet Temperature Signal Out of Range HIGH          |

Select the desired options in the **FONT** dialog box and click on

OK



Font: Times New Roman

Font style: Regular

Size: 10

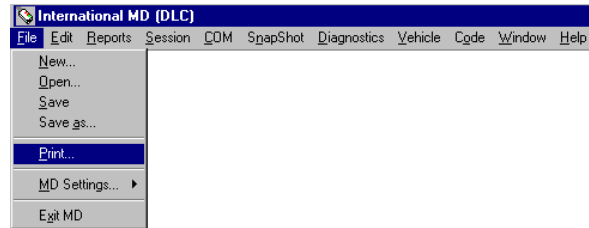
Effects: ☐ Strikethrough ☐ Underline

Color: Black

Script: Western

Sample: AaBbYyZz

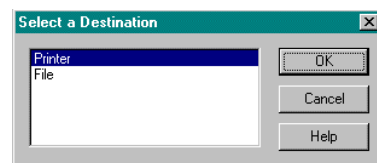
The information in the trouble code window may be printed. Selecting **File** and then **Print...** in the menu bar



HINT: Toolbar shortcut is by clicking on




You may send the printout to the printer or to a file

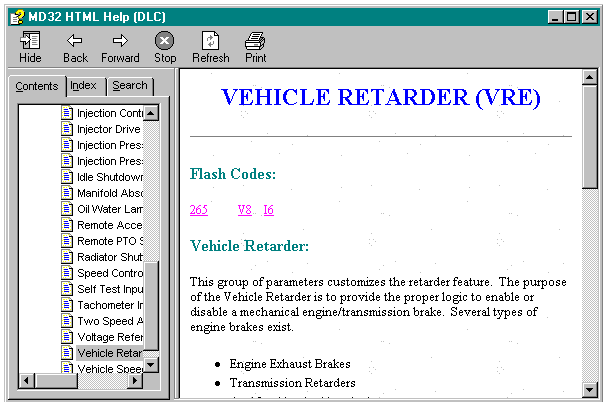


Double clicking on a trouble code will bring up more information regarding that trouble code. This is a hot link to the electronic service manual. This link is not associated with ISIS.

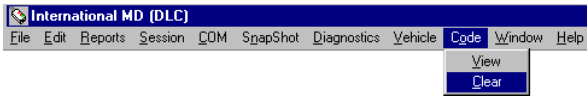
A screenshot of the 'Diagnostic Trouble Codes' window. It displays a table with columns: ATA Code, DTC, Status, and Description. The table lists various trouble codes and their descriptions. The code 'PID 055, FMI 11' is highlighted.

| ATA Code        | DTC | Status          | Description   |
|-----------------|-----|-----------------|---|
| SID 054, FMI 11 | 262 | Active          | Change Oil Lamp OCC Self Test Failed                    |
| SID 239, FMI 11 | 266 | Active          | Warn Engine Lamp OCC Self Test Failed                   |
| PID 055, FMI 11 | 265 | Active          | Vehicle Retarder Enable OCC Self Test Failed            |
| PID 100, FMI 04 | 211 | Active          | Engine Oil Press. Signal Out of Range LOW               |
| PID 102, FMI 04 | 122 | Active          | Intake Manifold Abs. Press. Signal Out of Range LOW     |
| PID 110, FMI 03 | 115 | Active          | Engine Coolant Temperature Signal Out of Range HIGH     |
| PID 164, FMI 04 | 124 | Active          | Injection Control Press. Signal Out of Range LOW        |
| SID 042, FMI 11 | 241 | Active/Inactive | Injection Control Press. Regulator OCC Self Test Failed |
| SID 056, FMI 11 | 246 | Active/Inactive | Engine Fan Control OCC Self Test Failed                 |
| SID 238, FMI 11 | 263 | Active/Inactive | Oil/Water Lamp OCC Self Test Failed                     |
| PID 091, FMI 04 | 131 | Active/Inactive | Accelerator Position Signal Out of Range LOW            |
| PID 108, FMI 04 | 152 | Active/Inactive | Barometric Press. Signal Out of Range LOW               |
| PID 171, FMI 03 | 155 | Active/Inactive | Air Inlet Temperature Signal Out of Range HIGH          |

Please see the section on E-Z Help (section III.12) for directions on navigating through the MD Help. When complete click on  in the upper right hand corner of the window to close it.



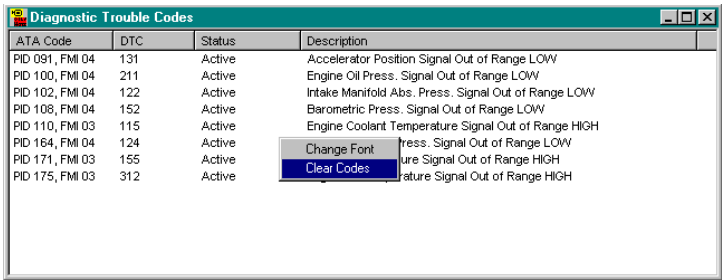
There are many ways to invoke the clear codes option. You may clear codes by selecting **Code**, and then the **Clear** option.



HINT: Toolbar shortcut is by clicking on



Another method to clear code is via the pop up menu. Place the mouse pointer anywhere in the trouble code window and right click once to bring up the pop up menu and then click on the **Clear Codes** option.

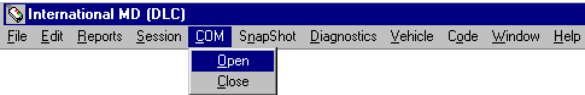


MD will remember how this window is configured as well as the location. So the next time MD is executed, this window will appear where it was.



5. ECM SOFTWARE ID INFORMATION

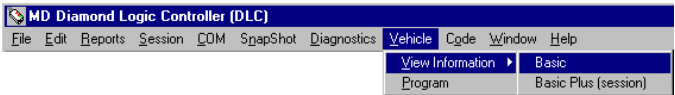
The electronic engine control module ID information can be displayed only after Key-On and ATA bus is opened. Selecting **COM** and then **Open** on the menu bar opens the ATA bus.



HINT: Toolbar shortcut is by clicking on



Selecting **Vehicle** and then **View Information** option in the menu bar opens the Vehicle Information window.



HINT: Toolbar shortcut is by clicking on

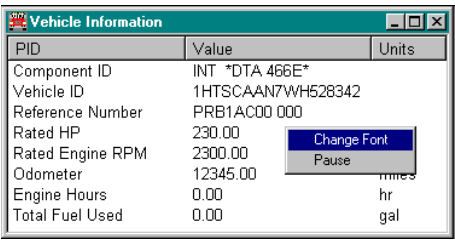


When you click on these options, the **Vehicle Information** window will appear. The **Vehicle Information** window is similar to the text view windows. It consists of three columns: **PID**, **Value**, and **Units**. The **PID** column shows the PID description or acronym. The **Value** column shows the current data value. The **Units** column shows the display value units, which may be English or Metric.

| Vehicle Information |                   |       |
|---------------------|-------------------|-------|
| PID                 | Value             | Units |
| Component ID        | INT *DTA 466E*    |       |
| Vehicle ID          | 1HTSCAAN7WH528342 |       |
| Reference Number    | PRB1AC00 000      |       |
| Rated HP            | 230.00            | hp    |
| Rated Engine RPM    | 2300.00           | rpm   |
| Odometer            | 12345.00          | miles |
| Engine Hours        | 0.00              | hr    |
| Total Fuel Used     | 0.00              | gal   |

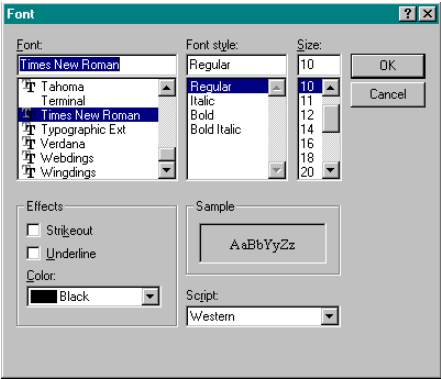
MD will remember how this window is configured as well as the location. So the next time MD is executed, this window will appear where it was.

Placing the mouse pointer within the window and right clicking will bring up advanced features. Click on the **Change Font** option to modify the display font type and size.

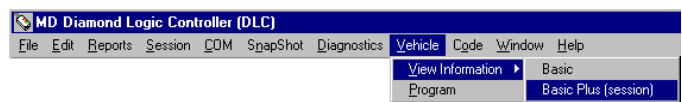


Select the desired options in the **FONT** dialog box and click on

OK



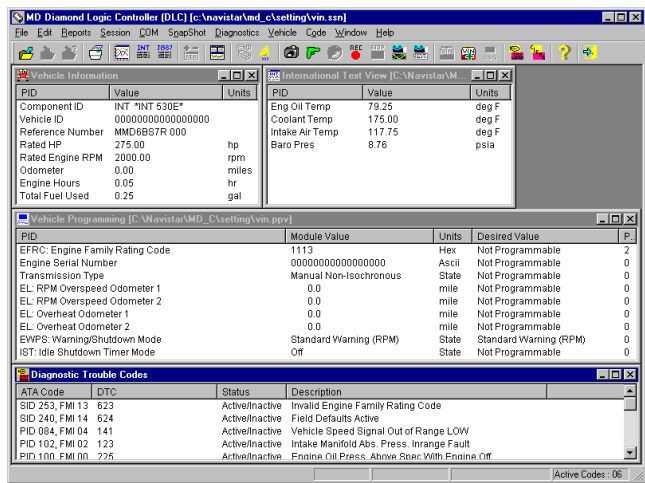
To expedite the information gathering of truck information, a new hot-link button is provided Selecting **Vehicle** and then **View Information** option in the menu bar opens the Vehicle Information window.



HINT: Toolbar shortcut is by clicking on

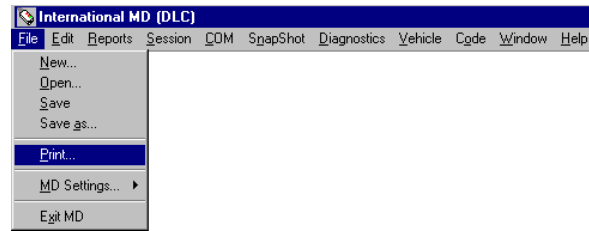


This opens a session that contains the VIN window, trouble code window, vehicle-programming window, and a PID text view window that shows the essential truck information.



This session may be replaced and/or over-written. This is to allow the user the capability to customize the session for their use.

The information in the Vehicle Information window may be printed. Select **File** and then **Print...** on the menu bar

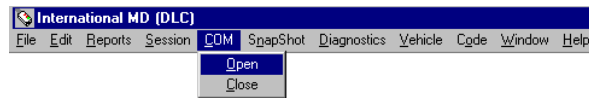


HINT: Toolbar shortcut is by clicking on



## 6. DIAGNOSTIC TESTS

To execute diagnostic test, first Key-On and then open the ATA bus. Selecting **COM** and then **Open** in the menu bar will open the ATA bus.

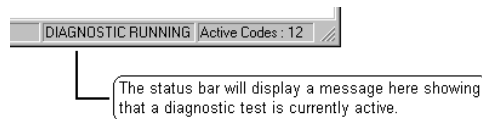


HINT: Toolbar shortcut is by clicking on

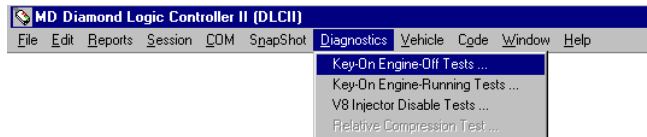





Then select **Diagnostics** in the menu bar and then the on-demand diagnostic test. These on-demand diagnostic aid tests may only be invoked via the menu. Please refer to the service manuals as to when to perform these tests and how to interpret the results of these tests. The diagnostic tests should be used in conjunction with text view windows, graphical view windows, and the trouble code window.

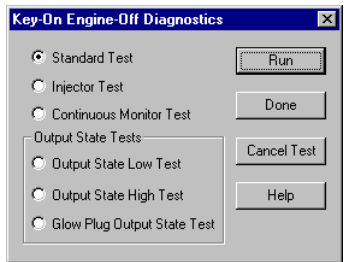
While a diagnostic test is active, the MD main window's status bar will display **DIAGNOSTIC RUNNING**.



Selecting the **Key-On Engine-Off Tests...** option to display a dialog box showing all the tests for the engine electronics platform.



A dialog box displaying all available Key-On Engine-Off Diagnostic tests will appear. Click on the radio button for the desired test and then click on  to execute the test. When complete with the Key-On Engine-Off diagnostics tests, click on . Cancel an active test at anytime by clicking on .



The content of this dialog box is dependent on the engine electronics platform. Confirm the engine electronics platform by looking at the MD main window's title bar. You must exit MD in order to change the engine electronics platform.

The **Key-On Engine-Off Standard Test** will cause the electronics to perform an internal self-test. This Standard test must be completed before another Key-On Engine-Off test may be initiated.

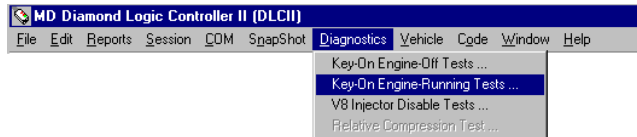
The **Key-On Engine-Off Injector Test** (a.k.a. the Buzz Test) will cause the electronics to exercise the Injectors.

The **Key-On Engine-Off Continuous Monitor Test** will cause the electronics to be more sensitive to fault condition. This will provide a quicker response and a faster reporting of the fault condition. In addition, the EECM will begin to broadcast special A/D voltage PIDs. It is recommended that this test be invoked in conjunction with opening the “ContinuousMonitor” session (please see section III.9 for more details on sessions).

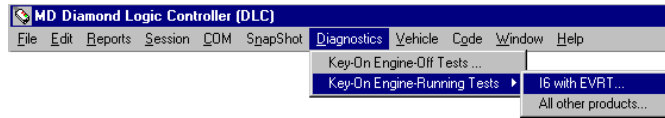
The **Key-On Engine-Off Output State Low Test** and the **Key-On Engine-Off Output State High Test** will cause the electronics to cycle the output devices on or off. To invoke this test, please select the Key-On Engine-Off Output State Low Test first; then followed by the Key-On Engine-Off Output State High Test when desired. To end this diagnostics test, please select the **Key-On Engine-Off Output State Low Test** option before canceling diagnostics test.

The **Key-On Engine-Off Glow Plug Output State Test** will cause the electronics to energize the glow plug relay for a maximum time of 2 minutes.

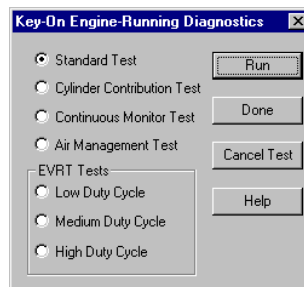
Selecting the **Key-On Engine-Running Tests...** option to display a dialog box showing all of the tests for the engine electronics platform.



For the DLC engine electronics platform, two Key-On Engine-Running tests are available. Please select the proper option based on the turbo on the engine.



A dialog box displaying all available Key-On Engine-Running Diagnostic tests will appear. Click on the radio button for the desired test and then click on **Run** to execute the test. When complete with the Key-On Engine-Running diagnostics tests, click on **Done**. Cancel an active test at anytime by clicking on **Cancel Test**.



The content of this dialog box is dependent on the engine electronics platform. Confirm the engine electronics platform by looking at the MD main window's title bar. You must exit MD in order to change the engine electronics platform.



The **Key-On Engine-Running Standard Test** will cause the electronics to exercise the basic mechanical sub-systems on the engine. This Standard test must be completed before another Key-On Engine-Running test may be initiated. It is recommended that this test be invoked in conjunction with opening the “KOER\_Standard” session (please see section III.9 for more details on sessions).

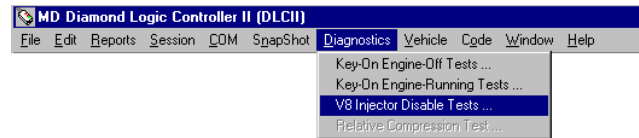
The **Key-On Engine-Running Cylinder Contribution Test** (formally known as the Key-On Engine-Running Injector Test) will cause the electronics to perform a cylinder contribution test. This will indicate how well each cylinder is contributing. It is recommended that this test be invoked in conjunction with opening the “KOER\_CCT” session (please see section III.9 for more details on sessions).

The **Key-On Engine-Running Continuous Monitor Test** will cause electronics to be more sensitive to fault condition. This will provide a quicker response and a faster reporting of the fault condition. In addition, the EECM will begin to broadcast special A/D voltage PIDs. It is recommended that this test be invoked in conjunction with opening the “ContinuousMonitor” session (please see section III.9 for more details on sessions).

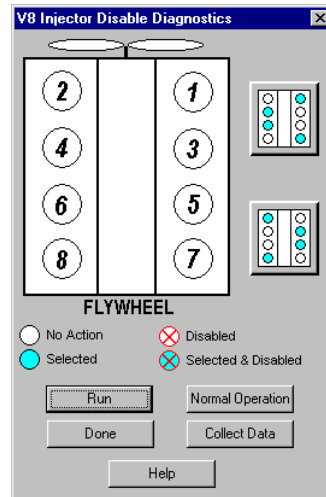
The **Key-On Engine-Running Air Management Test** will cause electronics to exercise the VGT and EGR sub-systems. This will indicate the functionality of the VGT control valve, EGR valve, intake system, and exhaust system. It is recommended that this test be invoked in conjunction with opening the “KOER\_AirManagement” session (please see section III.9 for more details on sessions).


The **Key-On Engine-Running EVRT Tests** will cause electronics to command a fixed control signal to cause the VGT to provide boost under a no load situation. This is to provide an on-demand test for diagnosing exhaust system and turbo problems. Three tests are available, **Low Duty Cycle**, **Medium Duty Cycle**, and **High Duty Cycle**. Please refer to the proper service manual for the use of these tests.



Select **V8 Injector Disable Tests...** option to display a dialog box showing the injector disable test.




A dialog box displaying on overhead view of the engine will appear.




Click on the cylinder to be disabled. The cylinder selected will be highlighted by changing its color to light blue. 

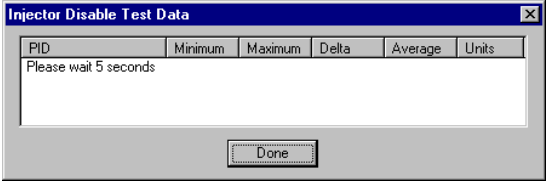
Click on  to execute the test. The cylinder that is actively disabled will be highlighted with a red X. 

Select a four cylinder idle mode by clicking the appropriate buttons on the side. The four cylinders as shown on the button will be highlighted by changing their colors to light blue. 

When complete with the Injector Disable tests, click on . To activate all cylinders click on .

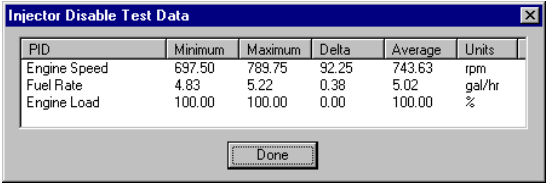
You do not need to run the Key-On Engine-Running Standard test prior to executing the Injector Disable Test. There is no temperature requirement as to when this test may be executed.

During the test, current engine operating data can be collected and analyzed to assist in determining if there is a power cylinder problem. To collect the data click on . You will be prompted to wait while data is being collected.



After the waiting period, the data will be displayed. The Injector Disable Test Data dialog box will display six columns: **PID**, **Minimum**, **Maximum**, **Delta**, **Average**, and **Units**.

- PID:** The parameter and Description of the parameter.
- Minimum:** The smallest value observed during the data collection period.
- Maximum:** The largest value observed during the data collection period.
- Delta:** The difference between the Maximum and Minimum values.
- Average:** The value in the middle of Maximum and Minimum values.
- Units:** The display values' unit

The image shows the same dialog box as before, but now it contains data. The table has six columns: PID, Minimum, Maximum, Delta, Average, and Units. The data rows are: Engine Speed (697.50, 789.75, 92.25, 743.63, rpm), Fuel Rate (4.83, 5.22, 0.38, 5.02, gal/hr), and Engine Load (100.00, 100.00, 0.00, 100.00, %). The "Done" button is still at the bottom.

| PID          | Minimum | Maximum | Delta | Average | Units  |
|--------------|---------|---------|-------|---------|--------|
| Engine Speed | 697.50  | 789.75  | 92.25 | 743.63  | rpm    |
| Fuel Rate    | 4.83    | 5.22    | 0.38  | 5.02    | gal/hr |
| Engine Load  | 100.00  | 100.00  | 0.00  | 100.00  | %      |

Please follow service manuals as to how to interpret the data.

It is recommended that this test be invoked in conjunction with opening the “KOER\_IDT\_V8” session (please see section III.9 for more details on sessions).

The EECM determines if the requested on-demand diagnostic test is to be executed. MD will provide warning messages as to the reason why the EECM did not executed the test. These message boxes appear as in the following example.



The warning messages and the reasons are documented below.

| MESSAGE                                    | REASON   | ACTION  |
|--|--|---|
| An undefined diagnostic test was requested | EECM received an unknown diagnostic test possibly due to communication error   | Retry the diagnostic test again   |
| The engine is currently running            | EECM detects engine speed, preventing it from executing an engine off diagnostic test  | Shut off the engine: Turn key to the on position: Retry the diagnostic test again.                        |
| The engine is currently not running        | EECM detects no engine speed, preventing it from executing an engine running diagnostic test   | Start engine: Retry the diagnostic test again.  |
| The vehicle is currently moving            | EECM detects vehicle movement, thus terminating the diagnostic test  | Stop vehicle: Apply parking brake: Follow recommended service procedure: Retry the diagnostic test again. |
| The test was aborted by the system         | EECM has aborted the diagnostic test   | Key off and then key on: Retry the diagnostic test again.   |
| The coolant temperature is out of range    | EECM detects the coolant temperature is not within the self-test range, preventing it from executing an engine running diagnostic test | Warm up the engine to normal operating temperature: Retry the diagnostic test again.                      |
| The accelerator pedal is not idle          | EECM detects accelerator pedal being applied   | Release accelerator pedal: Retry the diagnostic test again.   |
| The engine is not idle                     | EECM detects engine speed is not at low idle, preventing it from executing an engine running diagnostic test                           | Turn off all accessory: Deactivate PTO control: Retry the diagnostic test again.                          |
| The transmission is not in neutral         | EECM detects the transmission not in neutral, preventing it from executing an engine running diagnostic test                           | Verify the gear select is in P or release the clutch pedal: Retry the diagnostic test again.              |
| There is currently an active fault         | EECM has an active fault, preventing it from executing an engine running diagnostic test   | Diagnose and repair all active faults: Retry the diagnostic test again.                                   |

| MESSAGE                                     | REASON   | ACTION  |
|---|--|---|
| The requested test is out of sequence       | EECM requests that the proper test sequence be executed  | Apply the diagnostic test in the proper sequence as indicated by the service procedure.   |
| There was a CPU or RAM failure              | EECM has an internal CPU or RAM failure, preventing it from executing the diagnostic test              | Key off and then key on: Retry the diagnostic test again. If symptom persist please follow diagnostic procedure on diagnosing failed EECM   |
| Multiple tests were requested               | EECM is currently executing a different test   | Cancel diagnostic test: Retry the diagnostic test again.  |
| The ignition voltage was low                | EECM detects a low battery voltage, thus unable to continue diagnostic test                            | Use voltmeter to confirm low voltage: Repair symptom: Retry the diagnostic test again.  |
| Received an unknown diagnostic error        | MD received an unknown EECM diagnostic reply message   | Retry the diagnostic test again.  |
| Received a response for an invalid test     | MD received an EECM diagnostic reply message indicating a different diagnostics test is being executed | Cancel diagnostic test: Retry the diagnostic test again.  |
| No Response Received for Diagnostic Request | MD did not receive a proper message from the EECM indicating status of the diagnostic test             | Retry the diagnostic test: If symptom persists, verify the ATA communication interface cable is attached properly and that the ATA bus is active via the flashing LED on the communication interface cable. |

## 7. CAPTURE SNAPSHOT DATA

The snapshot feature is used to control when and what data will be recorded. This helps to locate electronic engine control system problems by focusing on when the symptom occurs. Snapshot setup controls recording of data by allowing the user to specify a set of conditions that will start recording. Snapshot can also record data before the trigger event.

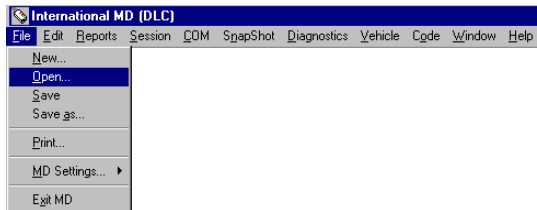
Select **Snapshot** and then **Setup** on the menu bar.



HINT: Toolbar shortcut is by clicking on



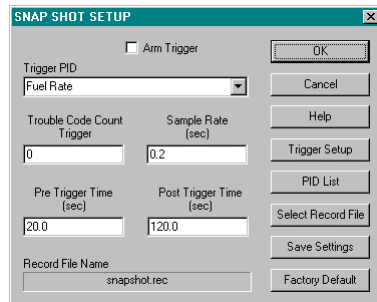
To open an existing snapshot setup from a file, select **File, Open**, and then select the trg as the files of type.



HINT: Toolbar shortcut is by clicking on



The **SNAPSHOT SETUP** dialog box will appear.



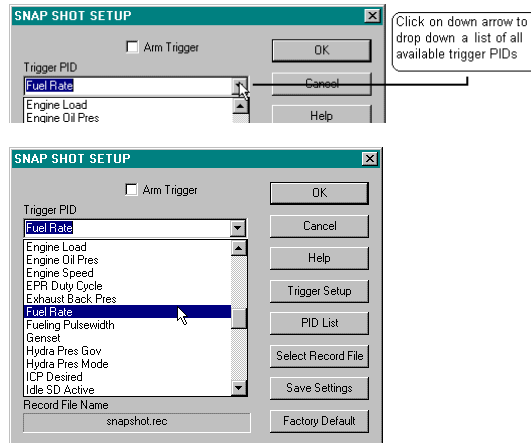
Here are the steps for using Snapshot:

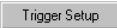
- 1) Select a trigger to begin snapshot recording: using automatic trigger.

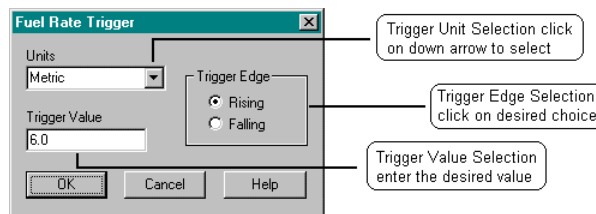
MD determines when to begin data recording by the trigger setup.  
MD allows two automatic triggers, which can be used together or separately.

a) Engine Parameter Trigger

- First, select an Engine Trigger PID for the trigger by first clicking on the down arrow to bring up the drop down list box and then click on the desired PID.

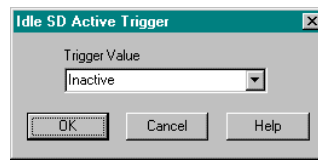


- Second, change the trigger conditions by clicking on 
- For numeric PIDs, select the desired unit for the trigger value, change the Trigger Value, and select the desired Trigger Edge.

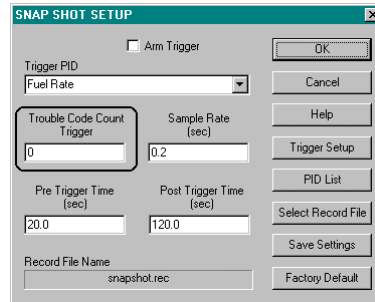




- An example: if "Fuel Rate" is selected as the trigger parameter, "6.0" L/hr is set as the trigger value, and "rising" edge is selected, MD will begin recording the data when fuel rate rises above 6.0 L/hr.
- For bitmap PIDs, select the desired status when the trigger event is to occur by changing the Trigger Value.

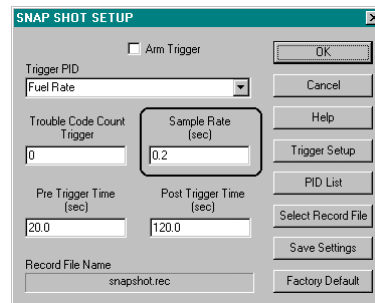


b) Trouble Code Trigger



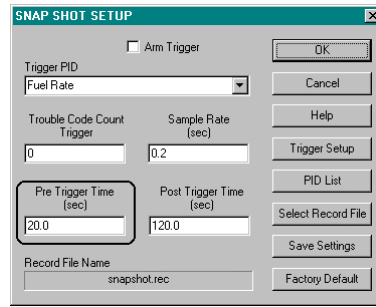
- Change the trouble code count to a non-zero value. This trigger mechanism is activated when this value is set to a number greater than zero. MD will begin recording data when the number of active trouble codes has reached above this value.

2) Set the Sample Rate.



This sets the rate as to how often to record data. Setup a shorter time if desired amount of data to collect is small. Setup a longer time if the desired amount of data to collect is large.

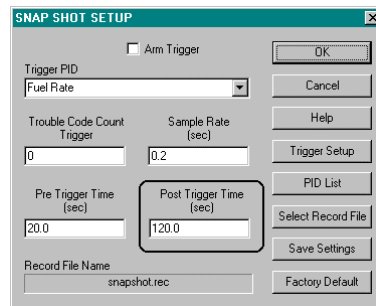
- 3) Set the Pre Trigger Time to record.



The SNAP SHOT SETUP dialog box is shown. The 'Pre Trigger Time (sec)' field is highlighted with a black border. The field contains the value '20.0'. Other fields include 'Trigger PID' (Fuel Rate), 'Trouble Code Count' (0), 'Sample Rate (sec)' (0.2), 'Post Trigger Time (sec)' (120.0), and 'Record File Name' (snapshot.rec). Buttons for OK, Cancel, Help, Trigger Setup, PID List, Select Record File, Save Settings, and Factory Default are visible on the right.

Setting this option allows data to be recorded just before the trigger event.

- 4) Set the Post Trigger Time to record.



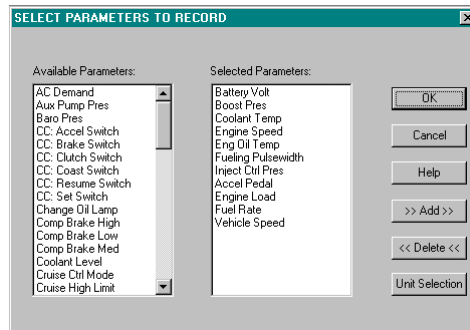
The SNAP SHOT SETUP dialog box is shown. The 'Post Trigger Time (sec)' field is highlighted with a black border. The field contains the value '120.0'. Other fields include 'Trigger PID' (Fuel Rate), 'Trouble Code Count' (0), 'Sample Rate (sec)' (0.2), 'Pre Trigger Time (sec)' (20.0), and 'Record File Name' (snapshot.rec). Buttons for OK, Cancel, Help, Trigger Setup, PID List, Select Record File, Save Settings, and Factory Default are visible on the right.

This sets the amount of data to record after the occurrence of the trigger event. **Only a total of 2000 time frames may be recorded at one time.** MD will warn you if this is exceeded. Reduce the Post Trigger time or the Pre Trigger time when this error message is displayed.

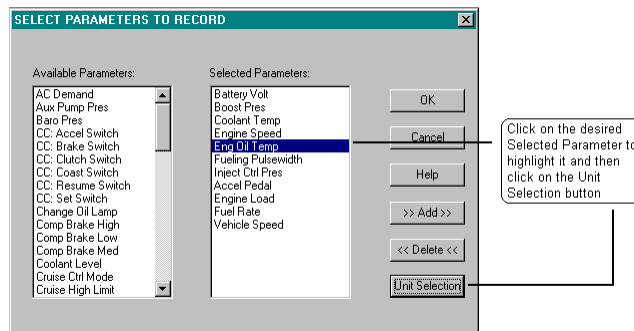


The Snapshot Error dialog box is shown. It contains the text: 'The total record time exceeds the 2000 frames that MD can record.' and an OK button.

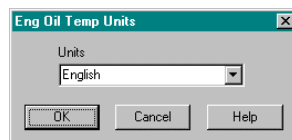
- 5) Click on **PID List** to select the engine parameters to record. The **SELECT PARAMETERS TO RECORD** dialog box will appear. The list on the left contains all the available engine parameters for recording. The list on the right contains the selected engine parameters to be recorded.




The numeric engine parameters may be recorded using different units. By default all parameters use the English units for recording. To change the unit selection, first click on the parameter and then click on **Unit Selection**



To change the recording unit, click on the down arrow button select the desired unit type and then click on **OK**




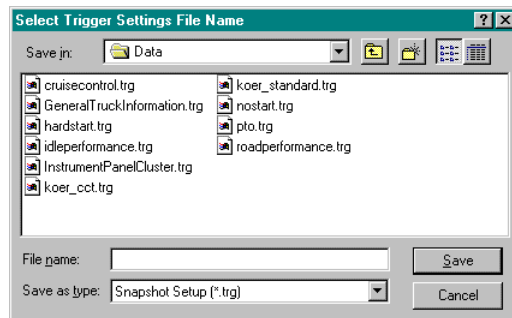
- 6) Set the file name.

Set the file name that will be used to save the recorded data. The recording files will have a (.rec) as the extension. Type in the desired recording file name and click on 



- 7) Save the Snapshot Settings.

Save this snapshot setup for later retrieval. The snapshot trigger setup files will have a (.trg) as the extension. Type in the desired file name and click on 



The snapshot settings are also saved as part of the session (please see section III.9). However, the snapshot settings saved as part of a session are not linked to a saved snapshot setup file (.trg).

Use the File Open option if this snapshot trigger setup file is to be used in the future.

8) Arm the Trigger or Disarm the Trigger.

To immediately allow for snapshot recording, check off the Arm Trigger option to enable MD to search for trigger condition.



The arm trigger option may be enabled later after snapshot settings have already been setup. Select **SnapShot** and then **Arm Trigger** on the menu bar to enable MD to search for the trigger conditions to begin snapshot recording.



HINT: Toolbar shortcut is by clicking on



The status bar in the bottom of the window should indicate that the trigger is armed.

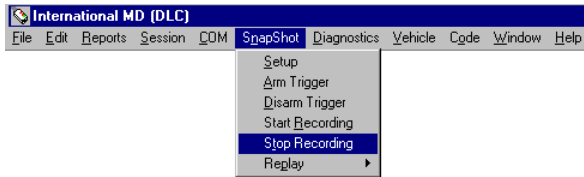


- 9) Wait for the trigger event or manually force the trigger to start recording.

A manual override trigger is available by selecting **SnapShot** and then **Start Recording** to initiate the recording



Select **SnapShot** and then **Stop Recording** to terminate and save the recording to a file.



HINT: Toolbar shortcut is by clicking on recording.



to start

HINT: Toolbar shortcut is by clicking on recording.



to stop

HINT: For the keyboard inclined individuals, F2 and F3 keys will function as start and stop recording, respectively.

The status bar at the bottom of the window should indicate that the snapshot recording is on going. The recording is complete and ready for replay when the RECORDING status disappears.



## 8. SNAPSHOT DATA RECORDING REPLAY

The replay feature will only play back recording files that were created by MasterDiagnostics software. The replay feature allows two different display types: graphical and textual.

### REPLAY VIA GRAPHICAL WINDOWS

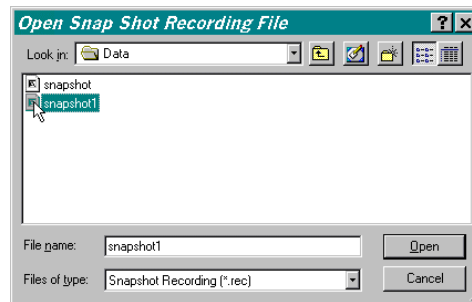
Select **Snapshot** then **Replay** and lastly **Graphical** in the menu bar.



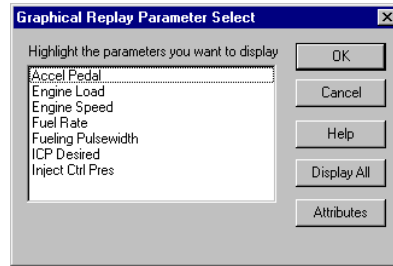
HINT: Toolbar shortcut is by clicking on




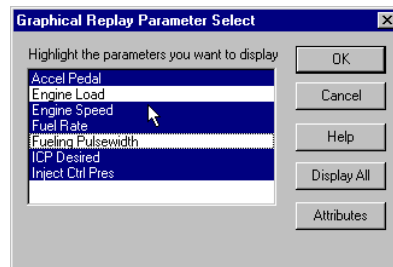
The **OPEN SNAPSHOT RECORDING FILE** dialog box will appear. Click on the filename to select it and then click on



A dialog box will appear prompting you to select the parameters to display.

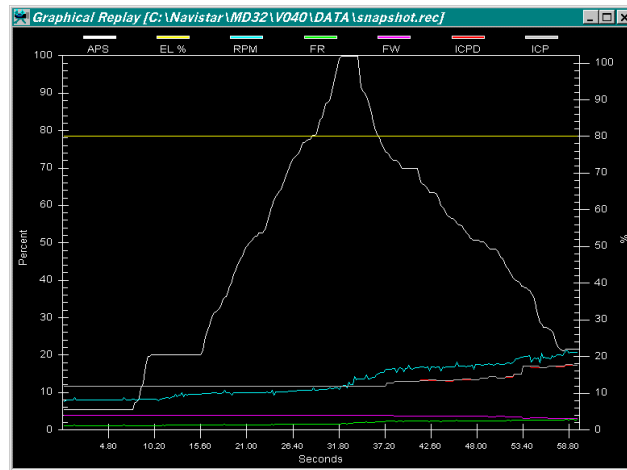


Select the parameter to display by clicking on the individual parameter or select all of the available parameters with the  button.

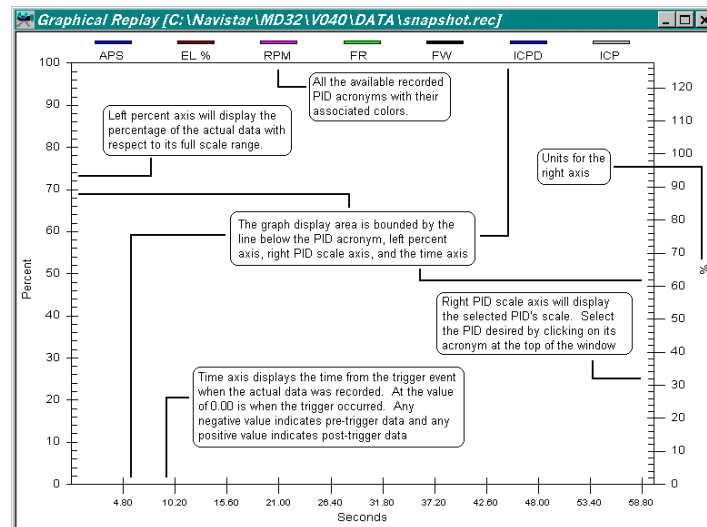




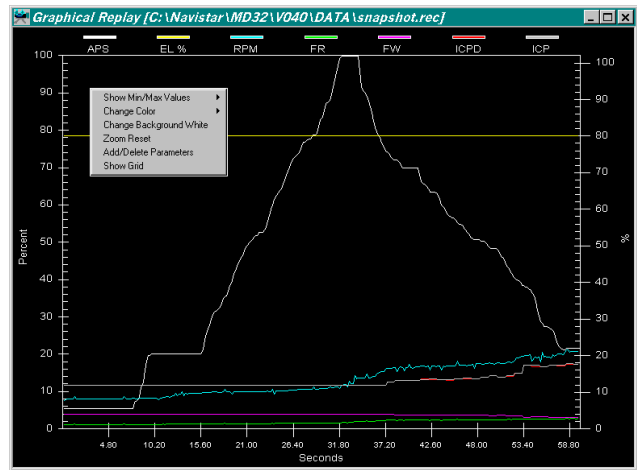
The display will be automatically adjusted to display the entire recording in the window. The color and the scaling for each recorded PID will also be automatically selected. The background color will initially be black as this is normally the desired color for contrast.



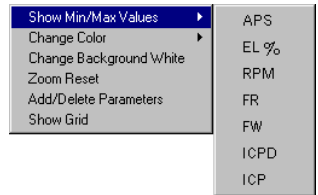
The anatomy of the graphical replay window is briefly described below.



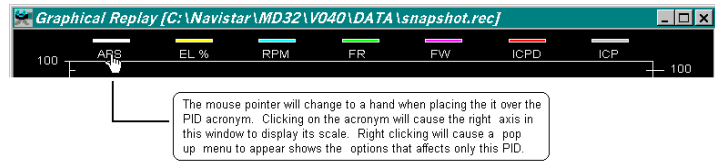
Right mouse clicking will bring up advanced features: **Show Min/Max Values**, **Change Color**, **Change Background White** (or **Change Background Black** depending on current background color), **Zoom Reset**, and **Show Grid** (or **Hide Grid** depending on current grid display).



The **Show Min/Max Values** option will display the selected parameter's minimum and maximum display ranges on the right scale. Clicking on this option brings up a list of available PIDs. Clicking on the desired PID will cause the right axis to display its scale.



The **Show Min/Max Values** option may also be accomplished by clicking on the acronym displayed at the top of the window.




Right clicking once will bring up the pop up menu when the mouse pointer is over a parameter acronym.

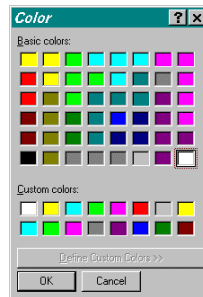


You may rescale the graph for a selected parameter by selecting the **Set Min/Max Value** option.

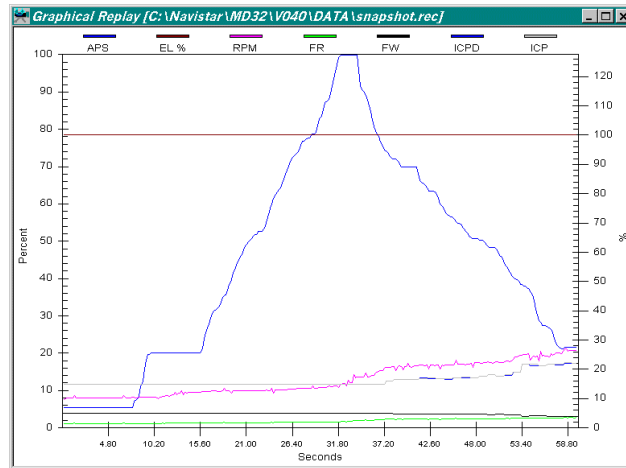


Upon setting a new Min/Max display range, the graphical replay window will automatically readjust all the lines in the window, which results in a zoom reset if the window is zoomed in.

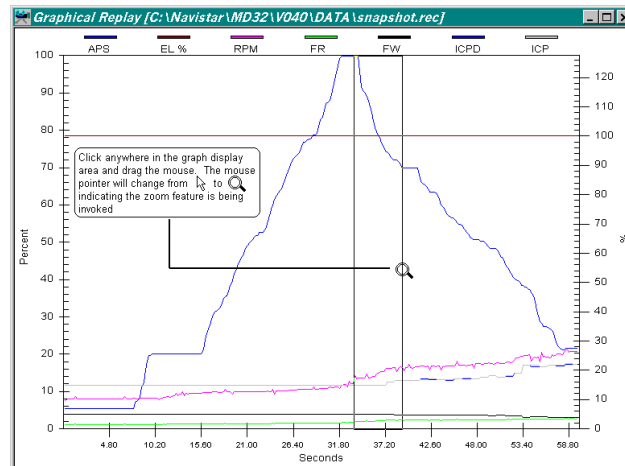
The **Change Color** option will allow the user to change the parameter's display color. When this option is invoked, the Color Palette dialog box will appear which allows the selection of a different color to represent the data. Click on the color of choice and then click on the  button.



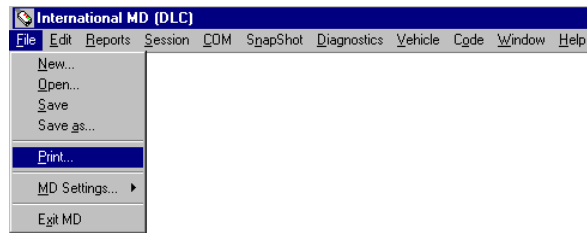
The **Change Background White** will toggle the background color to white for better contrast. It is strongly recommended that the background color be changed to white before invoking the print option. The color that appears in the window is what will be printed by the printer (i.e., if the background color is black, then the paper will be printed with a black background). Be advised that changing the background color does not automatically change the PID data display colors. Those colors must be changed individually.



Click and drag anywhere within the graph display area to zoom in a portion of the graph for a more detailed analysis. The mouse pointer will change to a magnifying glass indicating that the zoom feature is being invoked. The **Zoom Reset** option will reset the zoom-in factor to none and display the entire snapshot recording.



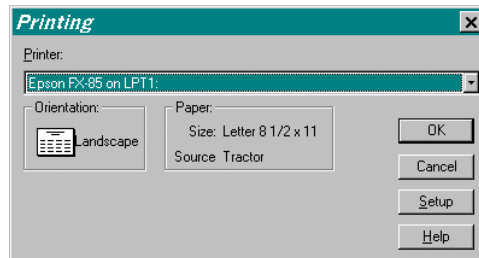
This window may be printed. It is strongly advised to change the background color to white prior to printing. Selecting **File** then **Print...** causes the print dialog box to appear



HINT: Toolbar shortcut is by clicking on



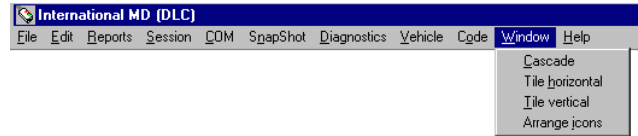
Select the desired printer and then click on the  button. If the print out does not appear correct, please use the Setup option to set up the printer. For more assistance in this feature, please see the Windows operating system user's manual.



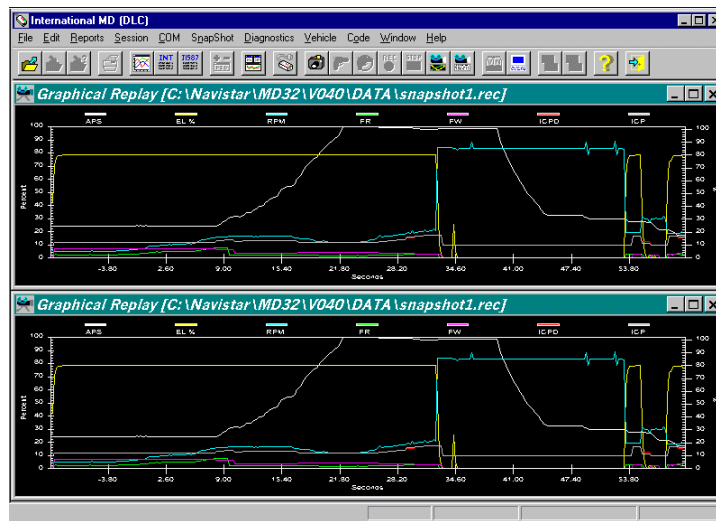
## HOW TO USE THE REPLAY GRAPHICAL WINDOWS FEATURE

Repeat the file opening process twice, so that the same recording is replayed in two separate windows. By opening the same recording file again, one window may be used to display the entire recording, and the other window may be used to display a zoomed-in portion of the recording.

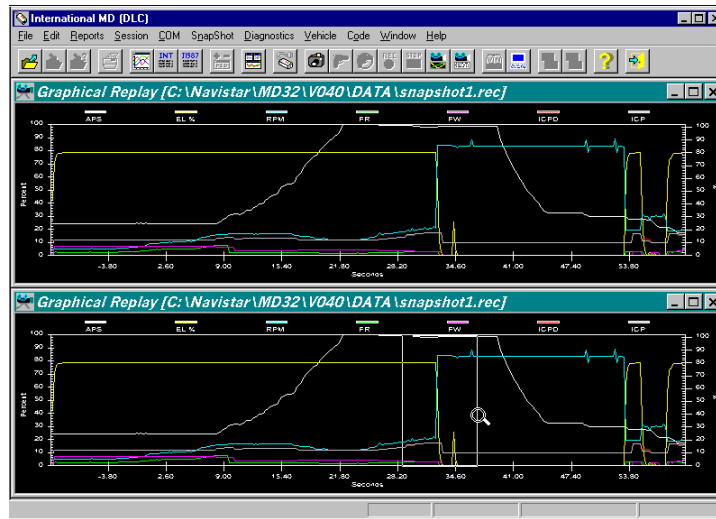
To display both graphical replay windows on the computer screen, select **Window** in the menu bar and click on **Tile horizontal**.



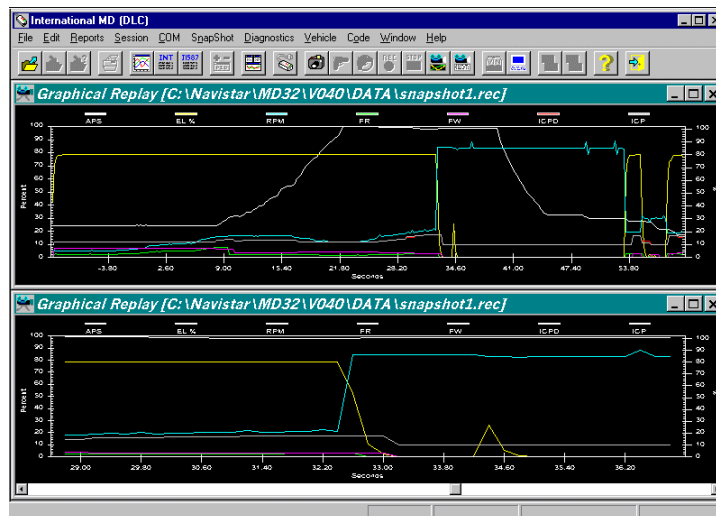
The two graphical replay windows will now be tiled on top of each other.



To zoom in, simply click and drag to cover the zoom in area. Use the scroll bar on the bottom of the window to move left or right.



Notice that a horizontal scroll bar will appear in the zoomed-in window. Scrolls left or right to see the other portions of the recording in the zoomed-in window.





## REPLAY VIA TEXTUAL WINDOWS

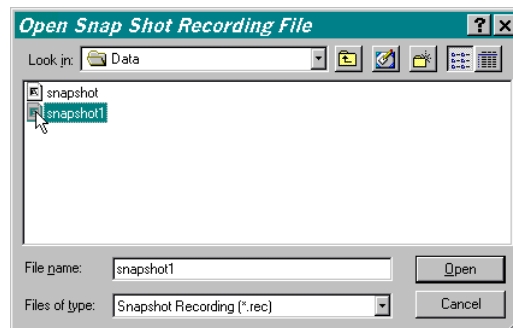
Select **SnapShot** then **Replay** and lastly **Text** in the menu bar.



HINT: Toolbar shortcut is by clicking on




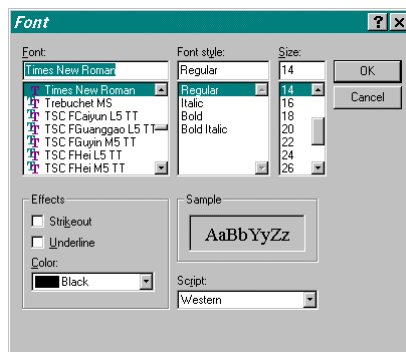
The **OPEN SNAP SHOT RECORDING FILE** dialog box will appear. Click on the filename to select it and then click on



The display will be automatically adjusted to display the entire recording in the window. The left most column indicates time. The next column is the active trouble code count, labeled as TCC. The data recorded will be shown in subsequent columns. The actual recorded data has the units as selected by the snapshot settings. If the recording unit was selected as Metric, then the data value is associated with kilometer, liters, degree Celsius, etc. If the recording unit was selected as English, then the data value is associated with miles, gallons, degree Fahrenheit, etc. The units are the same as the ones used in the Text View windows.

| TIME  | TCC | APS  | EL %   | RPM    | FR   | FW      | ICPD   |
|-------|-----|------|--------|--------|------|---------|--------|
| -0.40 | 6   | 5.60 | 100.00 | 312.25 | 1.10 | 2574.00 | 869.99 |
| -0.20 | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 0.00  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 0.20  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 0.40  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 0.60  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 0.80  | 6   | 5.60 | 100.00 | 353.75 | 1.25 | 2574.00 | 869.99 |
| 1.00  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 1.20  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 1.40  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 1.60  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 1.80  | 6   | 5.60 | 100.00 | 331.50 | 1.17 | 2574.00 | 869.99 |
| 2.00  | 6   | 5.60 | 100.00 | 331.25 | 1.17 | 2574.00 | 869.99 |
| 2.20  | 6   | 5.60 | 100.00 | 331.50 | 1.17 | 2574.00 | 869.99 |
| 2.40  | 6   | 5.60 | 100.00 | 331.25 | 1.17 | 2574.00 | 869.99 |
| 2.60  | 6   | 5.60 | 100.00 | 330.75 | 1.17 | 2574.00 | 869.99 |
| 2.80  | 6   | 5.60 | 100.00 | 332.00 | 1.18 | 2574.00 | 869.99 |
| 3.00  | 6   | 5.60 | 100.00 | 332.00 | 1.18 | 2574.00 | 869.99 |
| 3.20  | 6   | 5.60 | 100.00 | 331.25 | 1.17 | 2574.00 | 869.99 |
| 3.40  | 6   | 5.60 | 100.00 | 331.00 | 1.17 | 2574.00 | 869.99 |
| 3.60  | 6   | 5.60 | 100.00 | 330.75 | 1.17 | 2574.00 | 869.99 |
| 3.80  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 |
| 4.00  | 6   | 5.60 | 100.00 | 330.25 | 1.17 | 2574.00 | 869.99 |
| 4.20  | 6   | 5.60 | 100.00 | 330.00 | 1.17 | 2574.00 | 869.99 |

Right mouse clicking will bring up advanced features: **Change Fonts**. Clicking on this option brings up the Font dialog box. Make the appropriate selection and click on the  button to continue.



Often, it is necessary to re-size some of the columns in the window. Move the mouse pointer to the line between the columns in the heading bar. The mouse pointer will change from an arrow to a bar with arrows on left and right side. Click and drag to resize the width of the column or double clicking at this point will cause the column to be automatically re-sized to fit the widest entry in the column.

Text Replay [C:\Navistar\MD32\V040\DATA\snapshot.rec]

| TIME  | TCC | APS  | EL %   | RPM    | FR   | FW      | ICPD   | ICP    |
|-------|-----|------|--------|--------|------|---------|--------|--------|
| -0.40 | 6   | 5.60 | 100.00 | 312.25 | 1.10 | 2574.00 | 869.99 | 869.99 |
| -0.20 | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.00  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |

Place the mouse pointer over the line dividing the columns. The mouse pointer will change its shape. Click and drag to change the width or double click to automatically resize

The time scale on the left most column, which is labeled TIME, is based on the recording file and 0.0 indicates when the automatic or manual trigger occurred. The second column, which is labeled TCC, is the active trouble code count. The active trouble code count is the number of active faults. This value is normally displayed in the status bar.

Text Replay [C:\Navistar\MD32\V040\DATA\snapshot.rec]

| TIME  | TCC | APS  | EL %   | RPM    | FR   | FW      | ICPD   | ICP    |
|-------|-----|------|--------|--------|------|---------|--------|--------|
| -0.40 | 6   | 5.60 | 100.00 | 312.25 | 1.10 | 2574.00 | 869.99 | 869.99 |
| -0.20 | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.00  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.20  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.40  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.60  | 6   | 5.60 | 100.00 | 331.75 | 1.18 | 2574.00 | 869.99 | 869.99 |
| 0.80  | 6   | 5.60 | 100.00 | 333.75 | 1.25 | 2574.00 | 869.99 | 869.99 |

The column heading are labeled with the PID acronyms. Use a Navistar Text View window to find the description and units associated with the PID acronyms

The TCC column indicates the active trouble code count, which is normally displayed in the status bar.

The TIME column indicates the recording time with respect to the trigger event. The time that the trigger occurred is marked as 0.00

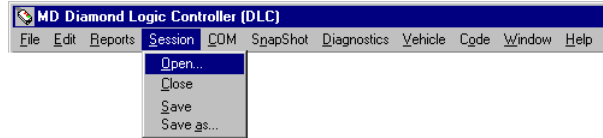
Multiple graphical play back windows and/or textual play back windows may be displayed at anytime. Resize the windows like any window by clicking and dragging at the corners or sides of the window. Reposition the window like any window by clicking and dragging the window's title bar. When all windows have been positioned and sized properly, the desktop may be saved as a session for later retrieval.

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## 9. SESSIONS

Session retrieves a previously setup desktop workspace. International Engine Reliability and Engineering has setup several diagnostic sessions. The desktop workspace will have all the needed text view windows, trouble code windows, ATA bus, etc., already pre-configured for your use.

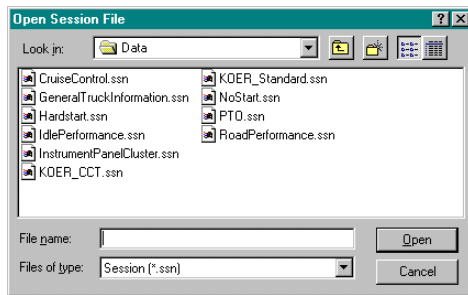
Selecting **Session** and then **Open** in the menu bar.



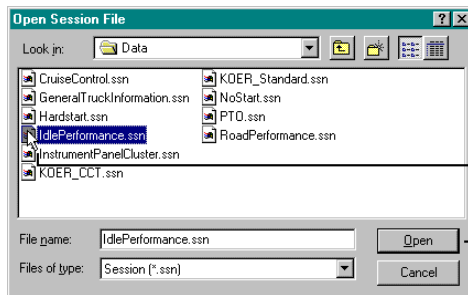
HINT: Toolbar shortcut is by clicking on



The **OPEN SESSION FILE** dialog box will appear.

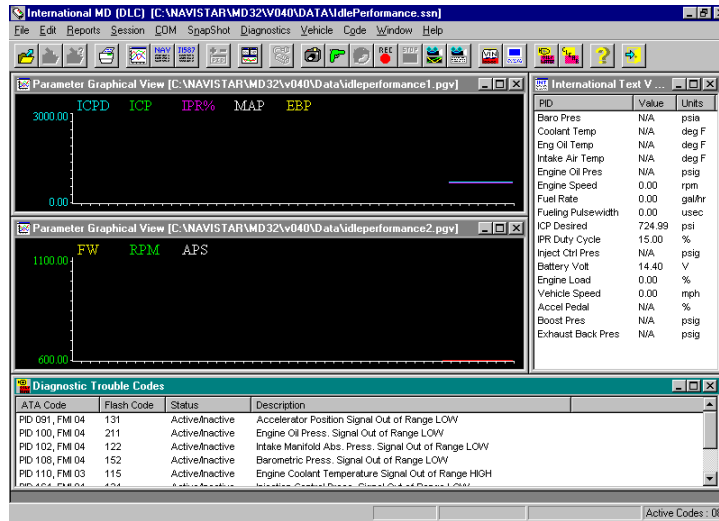


Click on the filename to select it and then click on

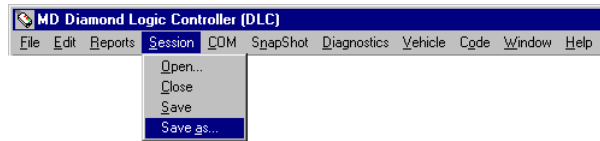


Select the session by placing the mouse pointer over the session file name and click it once to highlight it and then click on the Open button

The session will automatically be brought up. These windows are placed in an organized manner.

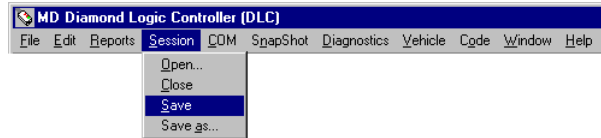


You may set up your own session and save it for future use. To save the session, begin by creating the windows of your choice (graphical view, text view, trouble code, vehicle programming, vehicle information, and ATA bus). Then, place the windows in the desired locations. Finally, selecting **Session** and then **Save As** in the menu bar will save the session to a user defined file name.

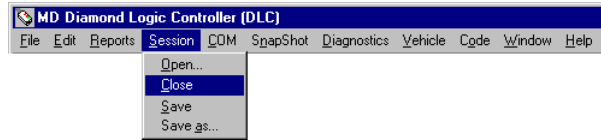


The session configurations saved include the locations of all display windows, the snapshot settings, and the status of the ATA bus (open or closed). The following are not saved as part of the session configuration: the list of parameters in the display windows, the font type and sizes in individual display windows, the data in the display windows, nor the snapshot setup file (.trg).

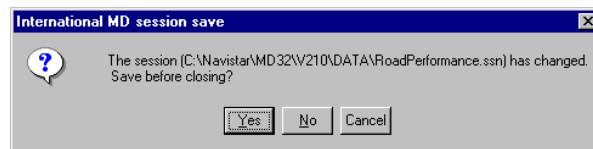
Selecting **Session** and then **Save** will save the current session using the current session name.




Selecting **Session** and then **Close** will clean up the desktop workspace.



If any of the windows have been changed in anyway, for example the font size is changed or an engine PID is added to a text view window, MD will automatically query to save the session.



To save the changes, click on 

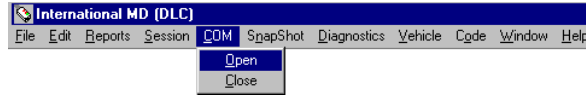
Please see the trouble shooting section of this manual if you encounter a situation where you need to recover a session provided by MD.

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## 10. VEHICLE PARAMETER PROGRAMMING

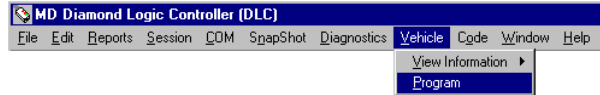
To begin, click on **COM** in the menu bar and then **Open**.



HINT: Toolbar shortcut is by clicking on



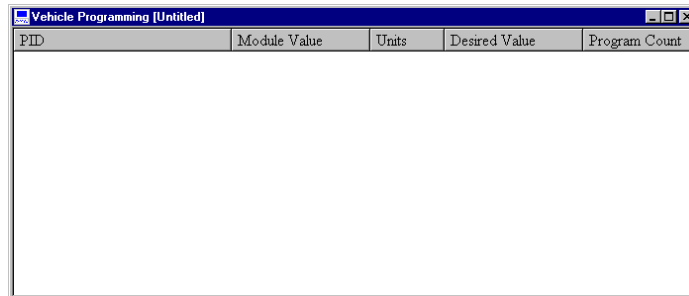
Selecting **Vehicle** and then **Program** in the menu bar creates a new vehicle-programming window.



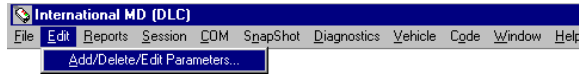
HINT: Toolbar shortcut is by clicking on



A generic vehicle-programming window will appear with no parameters in it. Vehicle Programming windows consist of five columns: **PID**, **Module Value**, **Units**, **Desired Value**, and **Program Count**. The **PID** column shows the programmable parameter's description. The **Module Value** column shows the data value stored in the EECM module. The **Units** column shows the display value units. The **Desired Value** is the intended programming value. The **Program Count** column shows the number of times that that programmable parameter had been modified.



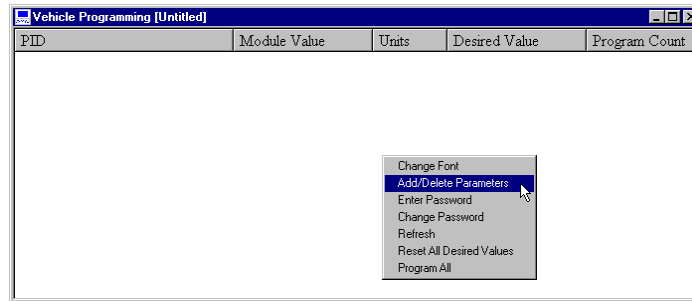
Add programmable parameters to this window by selecting **Edit** and then **Add/Delete/Edit Parameters** on the menu bar.



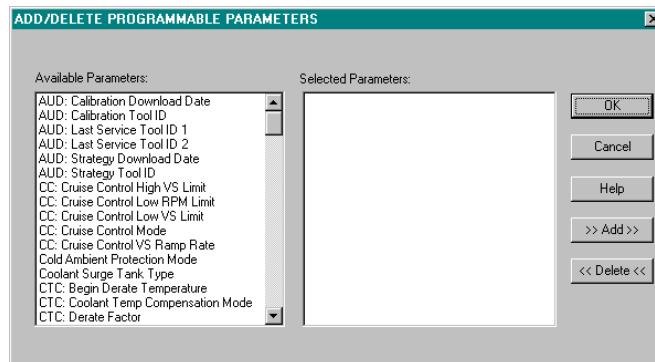
HINT: Toolbar shortcut is by clicking on




Another method to add programmable parameters is via the pop up menus. Place the mouse pointer inside the vehicle-programming window and right click once to bring up a pop up menu associated with this window type. In this pop up menu there are seven options: **Change Font**, **Add/Delete Parameters**, **Enter Password**, **Change Password**, **Refresh**, **Reset All Desired Values**, and **Program All**. Click on the **Add/Delete Parameter** option.

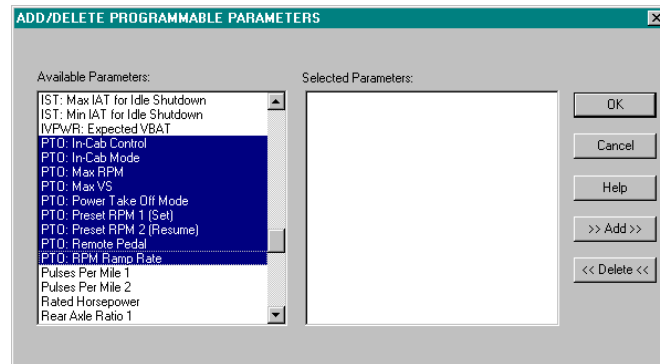


Any of the three methods will cause the **ADD/DELETE PROGRAMMABLE PARAMETERS** dialog box to appear

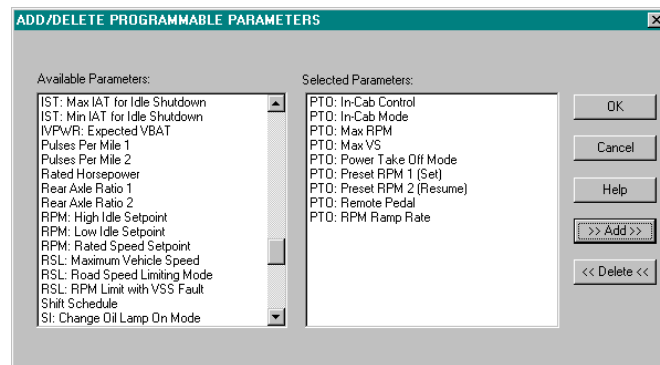




Double click on the parameter or click on all of the desired parameters in the **Available Parameter** list box, and then click on  to add parameters.


Use the vertical scroll bar to bring up the remaining parameters.



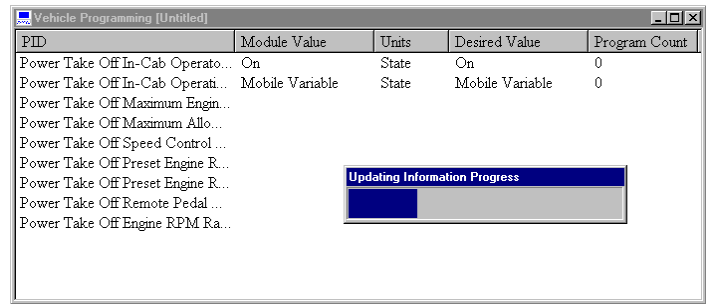
The selected parameters will appear in the **Selected Parameter** list box.



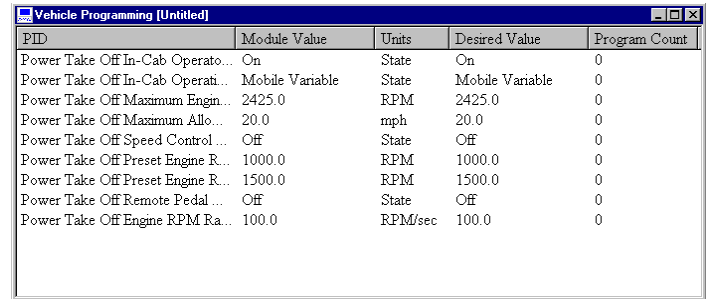
Double clicking on a parameter from the **Selected Parameter** list will remove it from the vehicle programming view window. The other way to remove parameters is to select all the parameters in the **Selected Parameter** list box, click on  and then click on .

When complete with the selection process, please click on  to continues.

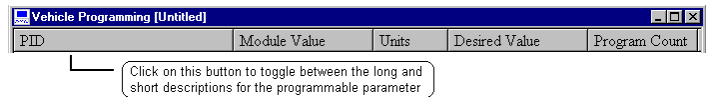
MD will now query the EECM module.



The selected programmable parameters will now appear in the vehicle-programming window with all the appropriate columns filled.



Click on the PID button to display the short descriptions for the PIDs.



Placing the mouse pointer within the window and right clicking will bring up advanced features. Click on the **Enter Password** option, which allows the password to be entered and retained for use.



**The password must be between 4 and 8 alphanumeric characters.**

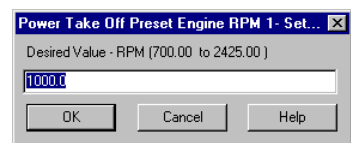
This **vehicle-programming** window is configured and ready to be used.

To modify a programmable parameter double click on it or right click.

| Vehicle Programming [Untitled] |                 |         |                 |               |
|--------------------------------|-----------------|---------|-----------------|---------------|
| PID                            | Module Value    | Units   | Desired Value   | Program Count |
| PTO: In-Cab Control            | On              | State   | On              | 0             |
| PTO: In-Cab Mode               | Mobile Variable | State   | Mobile Variable | 0             |
| PTO: Max RPM                   | 2425.0          | RPM     | 2425.0          | 0             |
| PTO: Max VS                    | 20.0            | mph     | 20.0            | 0             |
| PTO: Power Take Off Mode       | Off             | State   | Off             | 0             |
| PTO: Preset RPM 1 (Set)        | 1000.0          | RPM     | 1000.0          | 0             |
| PTO: Preset RPM 2 (Resume)     | 1500.0          | RPM     | 1500.0          | 0             |
| PTO: Remote Pedal              | Off             | State   | Off             | 0             |
| PTO: RPM Ramp Rate             | 100.0           | RPM/sec | 100.0           | 0             |

A dialog box will appear showing the appropriate changes that can be done with that programmable parameter. Two different types of dialog boxes may appear: *numeric/text* or *selectable*.

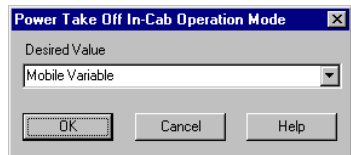
A *numeric/text* parameter dialog box



A dialog box titled "Power Take Off Preset Engine RPM 1 - Set...". It contains a text field with the value "1000.0" and a label "Desired Value - RPM (700.00 to 2425.00)". There are three buttons: "OK", "Cancel", and "Help".

For numeric parameters, enter the appropriate value. When complete, click on . The PID's description is displayed in the dialog box's title bar. The PID's valid range is displayed in parentheses.

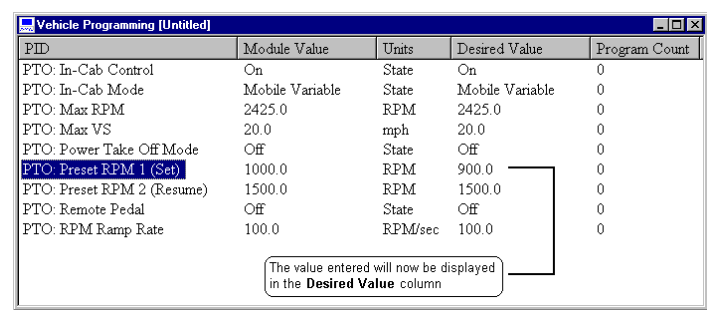
A *selectable* option parameter dialog box



A dialog box titled "Power Take Off In-Cab Operation Mode". It contains a dropdown menu with the value "Mobile Variable" and a label "Desired Value". There are three buttons: "OK", "Cancel", and "Help".

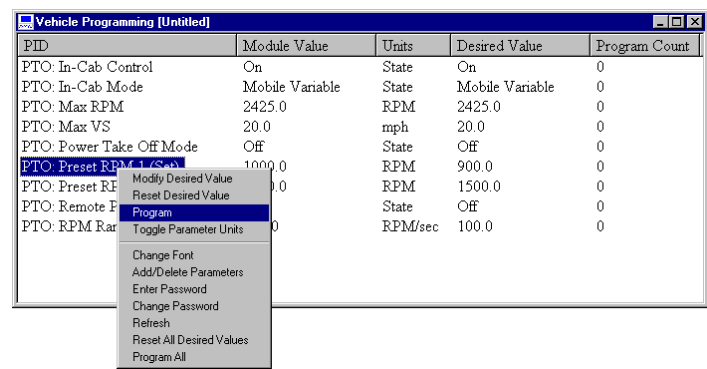
Make the desired changes by clicking on the down arrow and then the proper selection. When complete, click on . The PID's description is displayed in the dialog box's title bar.

The value will now appear in the **Desired Value** column.



| PID                        | Module Value    | Units   | Desired Value   | Program Count |
|----------------------------|-----------------|---------|-----------------|---------------|
| PTO: In-Cab Control        | On              | State   | On              | 0             |
| PTO: In-Cab Mode           | Mobile Variable | State   | Mobile Variable | 0             |
| PTO: Max RPM               | 2425.0          | RPM     | 2425.0          | 0             |
| PTO: Max VS                | 20.0            | mph     | 20.0            | 0             |
| PTO: Power Take Off Mode   | Off             | State   | Off             | 0             |
| PTO: Preset RPM 1 (Set)    | 1000.0          | RPM     | 900.0           | 0             |
| PTO: Preset RPM 2 (Resume) | 1500.0          | RPM     | 1500.0          | 0             |
| PTO: Remote Pedal          | Off             | State   | Off             | 0             |
| PTO: RPM Ramp Rate         | 100.0           | RPM/sec | 100.0           | 0             |

Select the **Program** option to program the value into the EECM module.



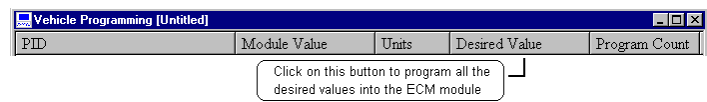
| PID                        | Module Value    | Units   | Desired Value   | Program Count |
|----------------------------|-----------------|---------|-----------------|---------------|
| PTO: In-Cab Control        | On              | State   | On              | 0             |
| PTO: In-Cab Mode           | Mobile Variable | State   | Mobile Variable | 0             |
| PTO: Max RPM               | 2425.0          | RPM     | 2425.0          | 0             |
| PTO: Max VS                | 20.0            | mph     | 20.0            | 0             |
| PTO: Power Take Off Mode   | Off             | State   | Off             | 0             |
| PTO: Preset RPM 1 (Set)    | 1000.0          | RPM     | 900.0           | 0             |
| PTO: Preset RPM 2 (Resume) | 1500.0          | RPM     | 1500.0          | 0             |
| PTO: Remote Pedal          | Off             | State   | Off             | 0             |
| PTO: RPM Ramp Rate         | 100.0           | RPM/sec | 100.0           | 0             |

- Modify Desired Value
- Reset Desired Value
- Program**
- Toggle Parameter Units
- Change Font
- Add/Delete Parameters
- Enter Password
- Change Password
- Refresh
- Reset All Desired Values
- Program All

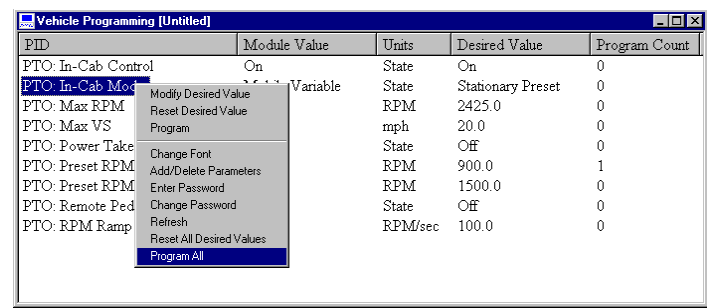
If programming was successful, the following message box should appear.



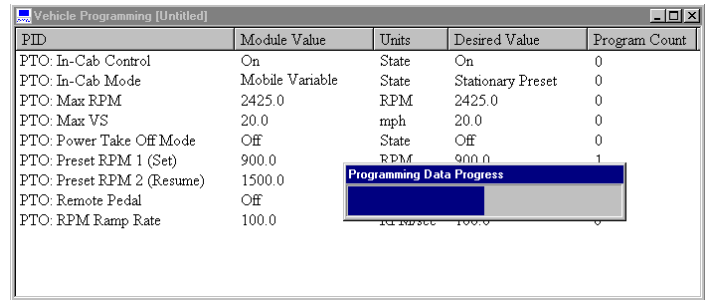
Another method to program the EECM module is to enter all the desired changes by selecting individual programmable parameters and changing their desired values. Then select the **Program All** option or click on the Desired Value button.



OR

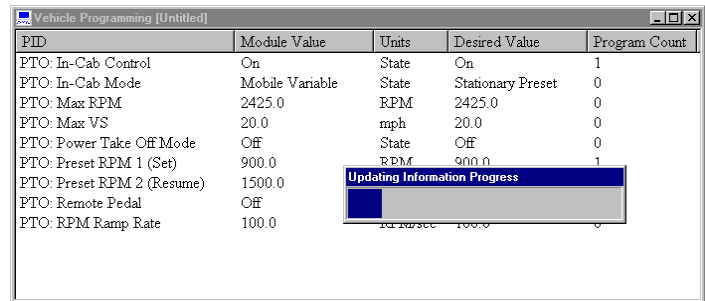


At this juncture, MD will attempt to program all the desired values for the programmable parameters in the window.

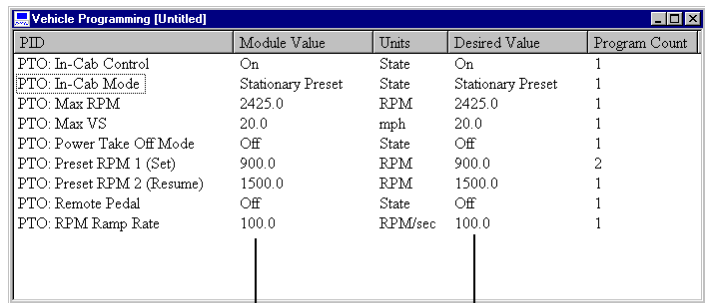


| PID                        | Module Value    | Units | Desired Value     | Program Count |
|----------------------------|-----------------|-------|-------------------|---------------|
| PTO: In-Cab Control        | On              | State | On                | 0             |
| PTO: In-Cab Mode           | Mobile Variable | State | Stationary Preset | 0             |
| PTO: Max RPM               | 2425.0          | RPM   | 2425.0            | 0             |
| PTO: Max VS                | 20.0            | mph   | 20.0              | 0             |
| PTO: Power Take Off Mode   | Off             | State | Off               | 0             |
| PTO: Preset RPM 1 (Set)    | 900.0           | RPM   | 900.0             | 1             |
| PTO: Preset RPM 2 (Resume) | 1500.0          |       |                   |               |
| PTO: Remote Pedal          | Off             |       |                   |               |
| PTO: RPM Ramp Rate         | 100.0           |       |                   |               |

Followed by refreshing the module value column



| PID                        | Module Value    | Units | Desired Value     | Program Count |
|----------------------------|-----------------|-------|-------------------|---------------|
| PTO: In-Cab Control        | On              | State | On                | 1             |
| PTO: In-Cab Mode           | Mobile Variable | State | Stationary Preset | 0             |
| PTO: Max RPM               | 2425.0          | RPM   | 2425.0            | 0             |
| PTO: Max VS                | 20.0            | mph   | 20.0              | 0             |
| PTO: Power Take Off Mode   | Off             | State | Off               | 0             |
| PTO: Preset RPM 1 (Set)    | 900.0           | RPM   | 900.0             | 1             |
| PTO: Preset RPM 2 (Resume) | 1500.0          |       |                   |               |
| PTO: Remote Pedal          | Off             |       |                   |               |
| PTO: RPM Ramp Rate         | 100.0           |       |                   |               |

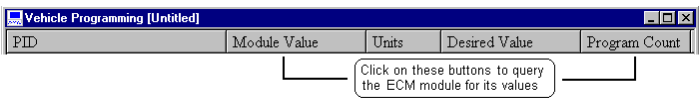


| PID                        | Module Value      | Units   | Desired Value     | Program Count |
|----------------------------|-------------------|---------|-------------------|---------------|
| PTO: In-Cab Control        | On                | State   | On                | 1             |
| PTO: In-Cab Mode           | Stationary Preset | State   | Stationary Preset | 1             |
| PTO: Max RPM               | 2425.0            | RPM     | 2425.0            | 1             |
| PTO: Max VS                | 20.0              | mph     | 20.0              | 1             |
| PTO: Power Take Off Mode   | Off               | State   | Off               | 1             |
| PTO: Preset RPM 1 (Set)    | 900.0             | RPM     | 900.0             | 2             |
| PTO: Preset RPM 2 (Resume) | 1500.0            | RPM     | 1500.0            | 1             |
| PTO: Remote Pedal          | Off               | State   | Off               | 1             |
| PTO: RPM Ramp Rate         | 100.0             | RPM/sec | 100.0             | 1             |

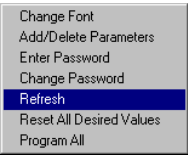
These two columns will now display the same values



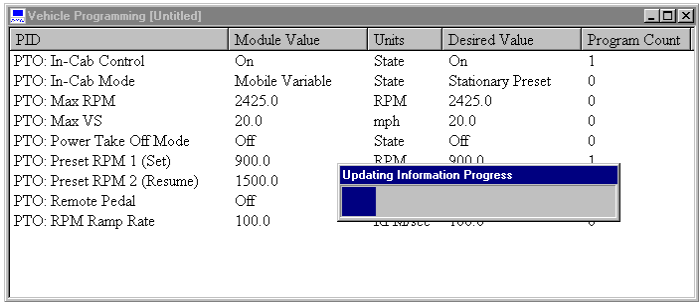
Clicking on the **Module Value** column heading button or the **Program Count** column heading button will query the EECM module for its values, which will be displayed under the **Module Value** column.



Another method is to right click in the window to cause the pop up menu to appear then click on **Refresh**.



At this time, MD will request all the programmable parameter information from the EECM. While the information is being updated, a progress bar will appear indicating the process is still active.

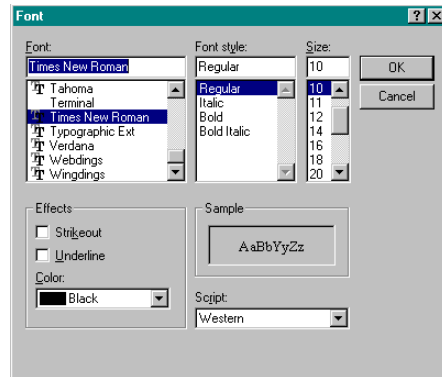


When all the information has been updated, the progress bar will disappear.

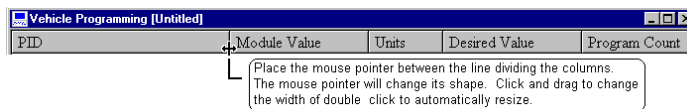
Placing the mouse pointer within the window and right clicking will bring up advanced features. Click on **Change Font** option to modify the display font type and size.

Select the desired options in the **FONT** dialog box and click on

OK



Often, it is necessary to re-size some of the columns in the text window. Move the mouse pointer to the line between the columns in the heading bar. The mouse pointer will change from an arrow to a bar with arrows on the left and right sides. Double clicking at this point will cause the column to be automatically re-sized to fit the widest entry in the column.



There are different types of parameters. Some parameters are factory programmable only. They will be shown as not programmable under the **Desired Value** column.

| Vehicle Programming [Untitled]  |                   |       |                  |               |
|---------------------------------|-------------------|-------|------------------|---------------|
| PID                             | Module Value      | Units | Desired Value    | Program Count |
| EFRC: Engine Family Rating Code | 1113              | Hex   | Not Programmable | 2             |
| AUD: Strategy Download Date     | 01092116          | Ascii | Not Programmable | N/A           |
| AUD: Calibration Download Date  | 01092116          | Ascii | Not Programmable | N/A           |
| EMD: ECM Serial Number          | 0352065           | Ascii | Not Programmable | N/A           |
| RPM: Low Idle Setpoint          | 700.0             | RPM   | Not Programmable | 0             |
| RPM: High Idle Setpoint         | 2425.0            | RPM   | Not Programmable | 0             |
| RPM: Rated Speed Setpoint       | 2000.0            | RPM   | Not Programmable | 0             |
| VIN                             | 00000000000000... | Ascii | Not Programmable | 0             |

The Not Programmable parameters are for information only. These parameters cannot be programmed via MD.

There are also special programmable parameters. Changing these parameters' values affect other parameters' values.

| PID                         | Module Value | Units       | Desired Value        | Program Count |
|-----------------------------|--------------|-------------|----------------------|---------------|
| Tire Revs                   | 362.000      | rev/mile    | Special Programmable | 4             |
| Transmission Gear teeth     | 16           | teeth       | Special Programmable | 0             |
| Transmission Top Gear Ratio | 0.600        |             | Special Programmable | 0             |
| Rear Axle Ratio 1           | 2.500        |             | Special Programmable | 0             |
| Rear Axle Ratio 2           | 2.500        |             | Special Programmable | 0             |
| Pulses Per Mile 1           | 18720.0      | pulses/mile | 18720.0              | 1             |
| Pulses Per Mile 2           | 18720.0      | pulses/mile | 18720.0              | 1             |

The special programmable parameters can only be programmed individually. As you program a special programmable parameter, MD will prompt you to update the other parameters that are affected by the special programmable parameter. For example, an edit parameter dialog box will appear by double clicking on "Tire Revs", which is a special programmable parameter.

**EDIT PARAMETER**

Tire Revolution per distance

Range = 300.00 to 676.00 rev/mile  
Program Count = 4

Current Value  
362.000

New Value

OK Cancel Help

After modifying the "Tire Revs" value, MD will display other dialog boxes prompting you to update the affected parameters. MD will also calculate the appropriate value for the affected parameter based on the new special programmable parameter's value. For example, "Low Axle Ratio Pulses Per Mile" is an affected parameter when you change "Tire Revs".

**EDIT PARAMETER**

Low Axle Ratio Pulses Per Mile or Kilometer

Range = 18017.00 to 157157.00 pulses/mile  
Program Count = 1

Current Value  
18720.0

New Value  
25000.00

OK Cancel Help

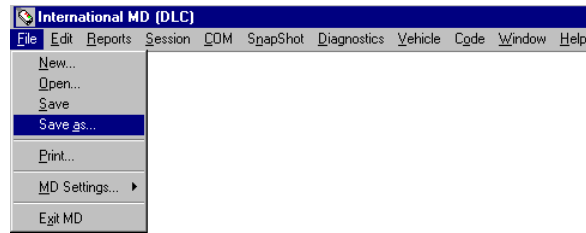
If there is a communication problem, the following message box should appear. Verify the ATA communication interface cable is attached properly and that the ATA bus is active via the flashing LED on the communication interface cable. Verify that the new programming values have been programmed. Attempt to re-program the values again if they have not been programmed.



If programming was unsuccessful, a message box should appear indicating the reason or condition that causes the unsuccessful programming. A list of all possible error messages can be found at the end of this section.



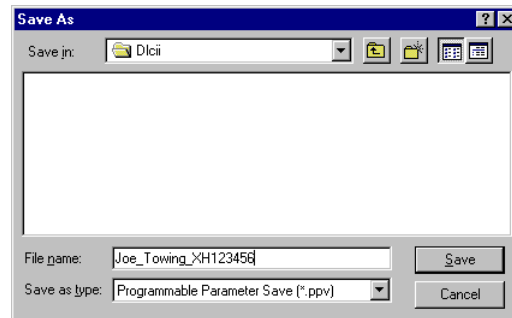
The information in this window can now be saved for future re-programming and/or kept as a log. Selecting **File** and then **Save as...** on the menu bar.



HINT: Toolbar shortcut is by clicking on

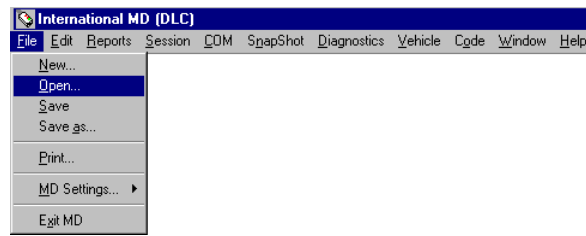


Save the file using a descriptive name so that it can be recalled easily.



The information saved in the file include the PIDs and their desired values. The actual EECM module values are not retained as they may change due to programming at other locations or tools.

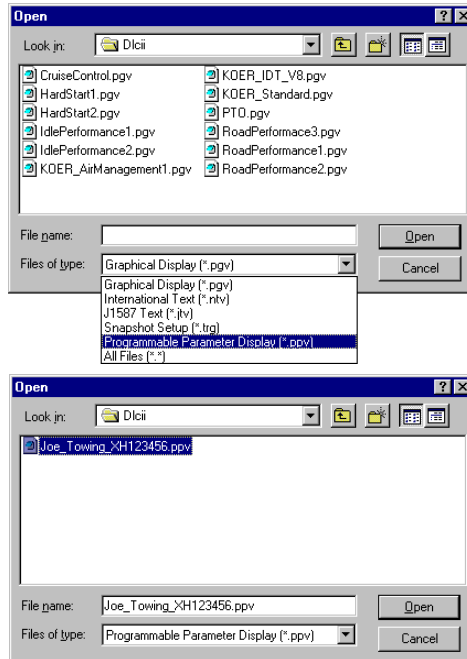
To recall the file in the future, select **File** and then **Open** on the menu bar.



HINT: Toolbar shortcut is by clicking on



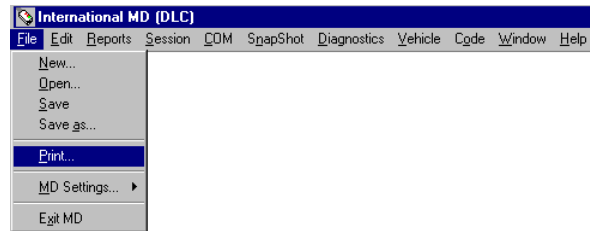
Select the .ppv file type and then click on the file.



Only one vehicle-programming window may be opened at a time. If you see the following error message simply close the existing vehicle-programming window and then re-open the saved file.



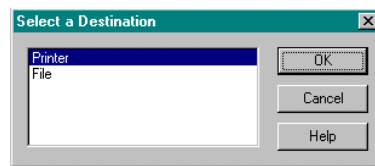
The information in these text view windows may be printed. Selecting **File** and then **Print...** on the menu bar



HINT: Toolbar shortcut is by clicking on



You may send the printout to the printer or to a file.





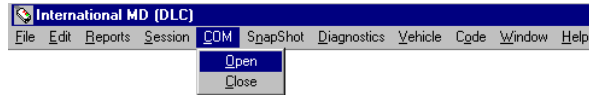
| MESSAGE  | REASON   | ACTION  |
|--|--|---|
| The customer password does not match.                          | Improper password entered.   | Re-enter the password and try again.  |
| The proprietary password does not match.                       | Improper NETS password.  | Re-attempt the programming again. If on continual failure, re-start entire process following recommended procedure as outlined by NETS. |
| The Engine is running.   | Engine is running or being cranked.                                  | Stop engine and try again.  |
| The vehicle is moving.   | Vehicle speed detected.  | Stop vehicle, apply parking brakes and try again.   |
| Calibration memory failure.                                    | Engine controller internal electronic failure.                       | Re-attempt to program. If on continual failure, please consult service manual on ECM fault detection and replacement.                   |
| Cannot read a write only file.                                 | Attempting to read protected memory of engine controller.            | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.                                    |
| Cannot write a read only file.                                 | Attempting to write to a protected memory of engine controller.      | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.                                    |
| Programming timeout.   | Engine controller has failed to program itself in the allotted time. | Re-attempt to program. If on continual failure, please consult service manual on ECM fault detection and replacement.                   |
| Data block too long to transmit while not in programming mode. | Communication failure between MD and engine controller.              | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.                                    |
| Length of data is too long or too short.                       | Communication failure between MD and engine controller.              | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.                                    |

| MESSAGE  | REASON   | ACTION  |
|--|--|---|
| Invalid parameter request.                                     | Communication failure between MD and engine controller.                                | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.  |
| Accumulator write active.                                      | Engine controller has failed to program itself, because it is busy with other process. | Re-attempt to program. If on continual failure, please consult service manual on ECM fault detection and replacement.   |
| Parameter does not have tattletale.                            | The programmable parameter to be programmed does not have a tattletale.                | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.  |
| Invalid password level.  | Communication failure between MD and engine controller.                                | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.  |
| Data block too long to transmit.                               | Communication failure between MD and engine controller.                                | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.  |
| Engine not in no-start mode.                                   | Engine is running, being cranked, or in diagnostics mode.                              | Stop engine, turn the ignition key to the off position and back to on, and try again.   |
| Received an unknown programming command error.                 | Communication failure between MD and engine controller.                                | Re-attempt to program. If on continual failure, please contact International Service Tool personnel.  |
| Engine controller is not responding to the programming command | Communications failure between MD and engine controller                                | Verify that the programming was successful via the refresh option. If symptom persists, verify ATA communication interface cable is attached properly and that the ATA bus is active via the flashing LED on the communication interface cable. If still unsuccessful, re-attempt to program the parameter again. |

## 11. REPORTS

The Reports feature allows information from several different windows to be printed at the same time. Not all Reports options may be available because it relies on information from various windows. There are three different types of reports: **VIN/DTC**, **VIN/Text**, and **VIN/DTC/Text**. The vehicle information window must be opened for any Reports options to be available. Open the **COM** port and the Vehicle Information window to utilize the Reports feature.

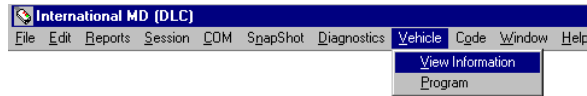
Selecting **COM** and then **Open** in the menu bar opens the ATA bus.



HINT: Toolbar shortcut is by clicking on



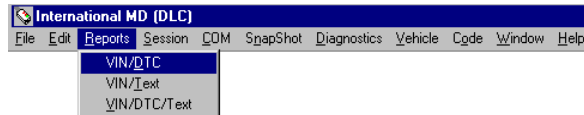
Selecting **Vehicle** and then **View Information** option in the menu bar opens the **Vehicle Information** window,



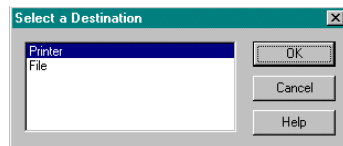
HINT: Toolbar shortcut is by clicking on



Selecting **Reports** and then **VIN/DTC** in the menu bar will print the information in the Vehicle Information window and all the trouble codes.



Select printer to send the print out to the printer.



The printout data will appear similar to the following.

```

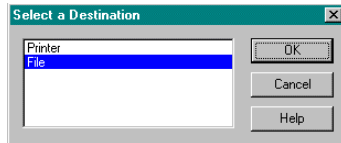
Component ID, INT *DTA 466E*,
Vehicle ID, 1HTSCAAN7WH528342,
Reference Number, PRB1AC00 000,
Rated HP, 195.00 , hp
Rated Engine RPM, 2300.00 , rpm
Odometer, 458.00 , miles
Engine Hours, 21.00 , hr
Total Fuel Used, 76.00 , gal

ACTIVE CODES: 02
PID 100, FMI 04, Engine Oil Press. Signal Out of Range LOW
PID 102, FMI 04, Intake Manifold Abs. Press. Signal Out of Range LOW

INACTIVE CODES: 03
PID 100, FMI 04, Engine Oil Press. Signal Out of Range LOW
PID 102, FMI 04, Intake Manifold Abs. Press. Signal Out of Range LOW
PID 108, FMI 04, Barometric Press. Signal Out of Range LOW

```

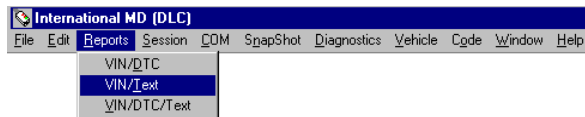
By selecting to print to a file, you may retrieve the information using other Windows applications like Microsoft Excel.



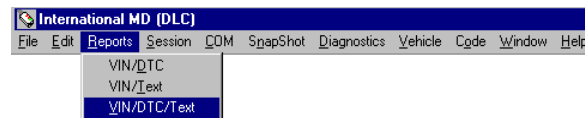
The following is an example file after it has been formatted.

|                    |                   |       |
|--------------------|-------------------|-------|
| Component ID       | INT *DTA 466E*    |       |
| Vehicle ID         | 1HTSCAAN7WH528342 |       |
| Reference Number   | PRB1AC00 000      |       |
| Rated HP           | 230               | hp    |
| Rated Engine RPM   | 2300              | rpm   |
| Odometer           | 12345             | miles |
| Engine Hours       | 0                 | hr    |
| Total Fuel Used    | 0                 | gal   |
| ACTIVE CODES: 00   |                   |       |
| INACTIVE CODES: 00 |                   |       |

Selecting **Reports** and then **VIN/Text** in the menu bar will print the information in the **Vehicle Information** window and all text view windows.



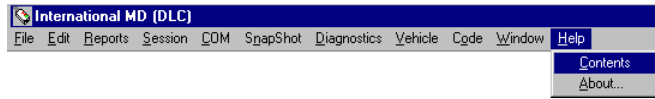
Selecting **Reports** and then **VIN/DTC/Text** in the menu bar will print the information in the **Vehicle Information** window, the trouble codes, and all text view windows.



## 12. E-Z HELP

This software release of MasterDiagnostics has an extensive set of documentation for the electronic help file. This section describes the organization and the layout of this new help.

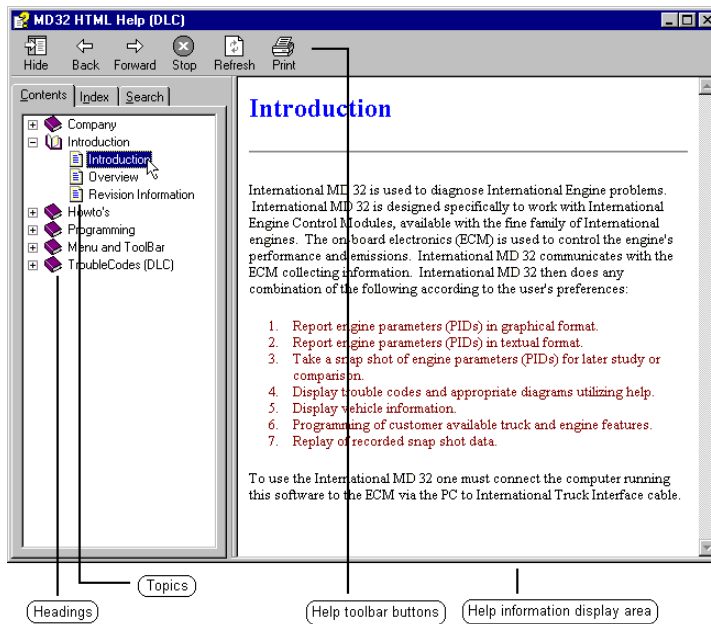
Select **Help** and then **Contents**.



HINT: Toolbar shortcut is by clicking on

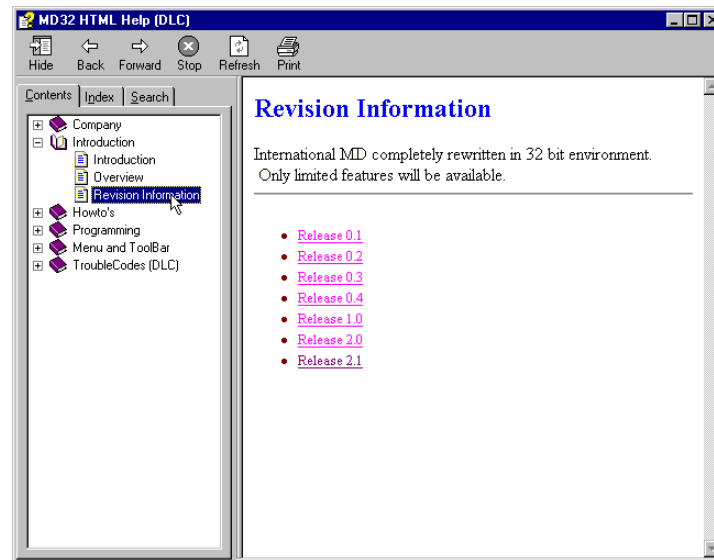


The new help will appear.

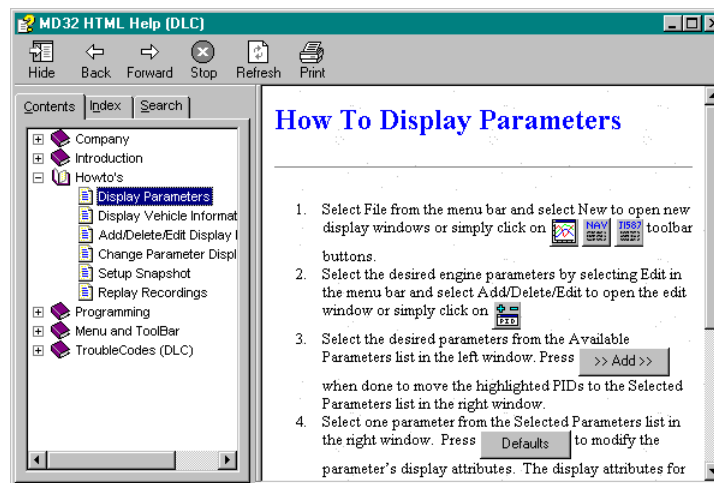




The new help is arranged under the following headings: **Company**, **Introduction**, **Howto's**, **Programming**, **Menus and Toolbar**, and **Trouble Codes (DLC)**.

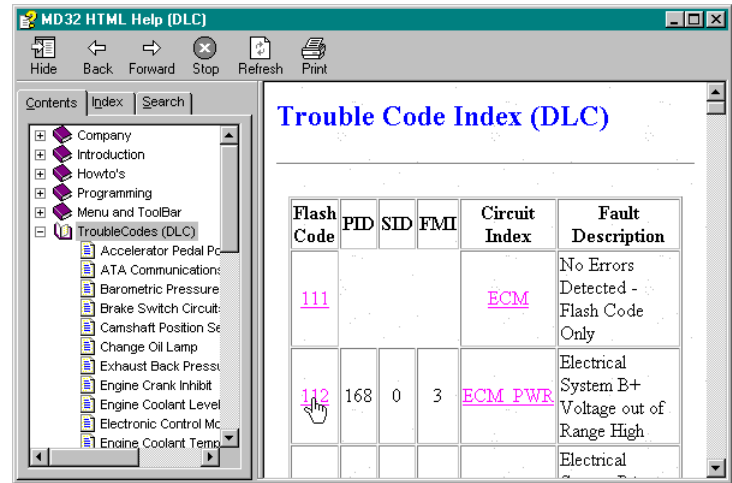
The **Introduction** topic contains the software revision information. This topic documents the changes to individual software release. Click on the topic titled **Revision Information** will display the software revision contained in this release.



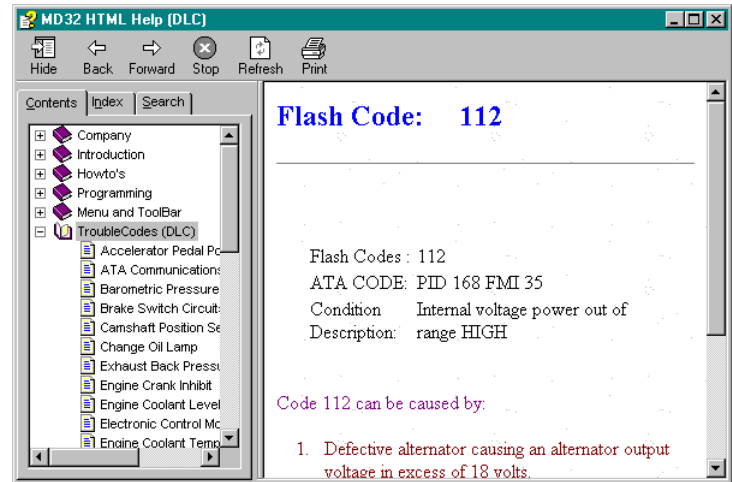
The **Howto's** topic describes the features of this software's usage, access, and examples. Double clicking on the heading labeled **Howto's** will display more help functions.



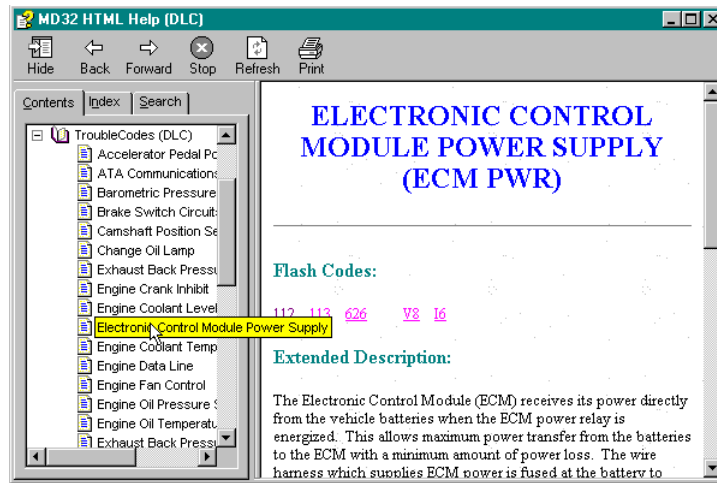
The **Trouble Codes (DLC)** topic contains service procedures and technical information on the International family of engines. Placing the mouse pointer over a flash code number or the circuit index causes the pointer to change from  to  which indicates that these topics are hotlinked.



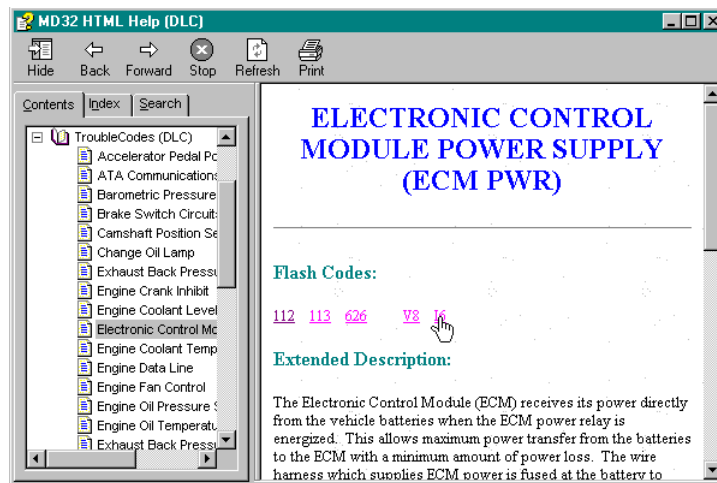
Example: clicking on the flash code brings up a detailed description as to the causes of the trouble code. This is normally displayed when double clicking on a trouble code in the Trouble Code window (please see section III.4).



Clicking on the circuit index will bring up a detailed description on the circuit involved with this trouble code. The circuit index is also organized under individual topic. When the mouse pointer is over a topic and the text is too long, the help will automatically highlight it and display the entire text.

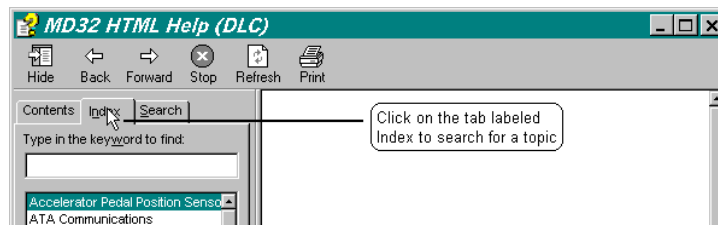


To review the circuit diagram, click on the V8 or the I6 hotlink.

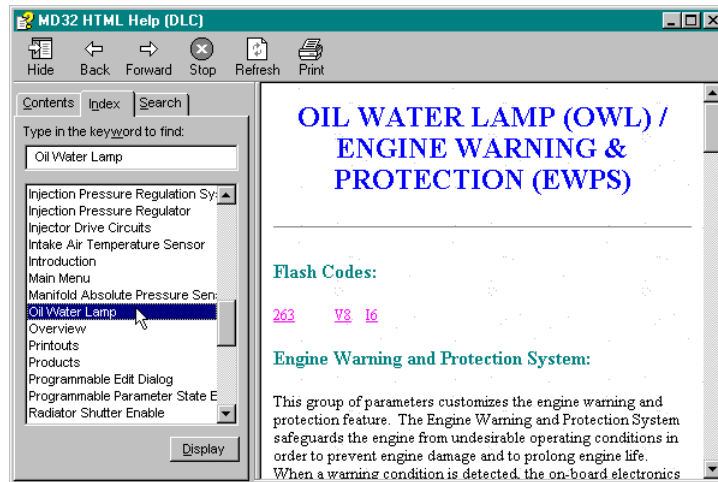




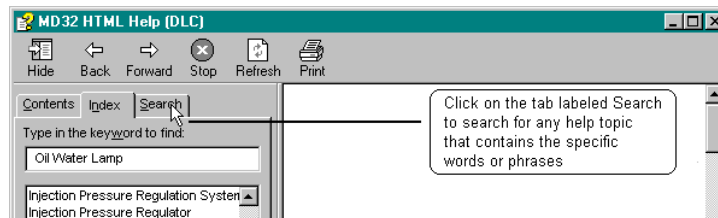
Click on the tab label **index** will display all EZ-HELP topic indexes.



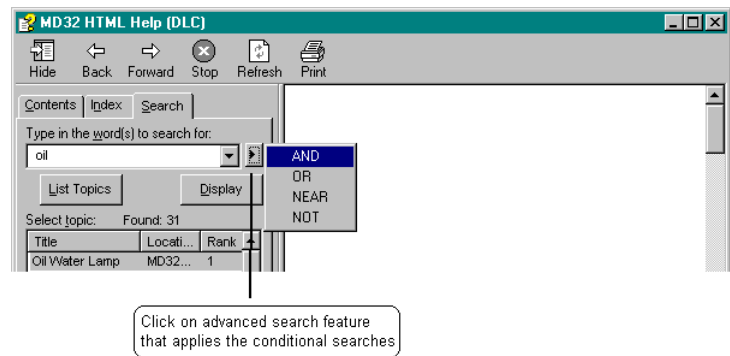
Double clicking on an index item will cause the help information to be displayed.





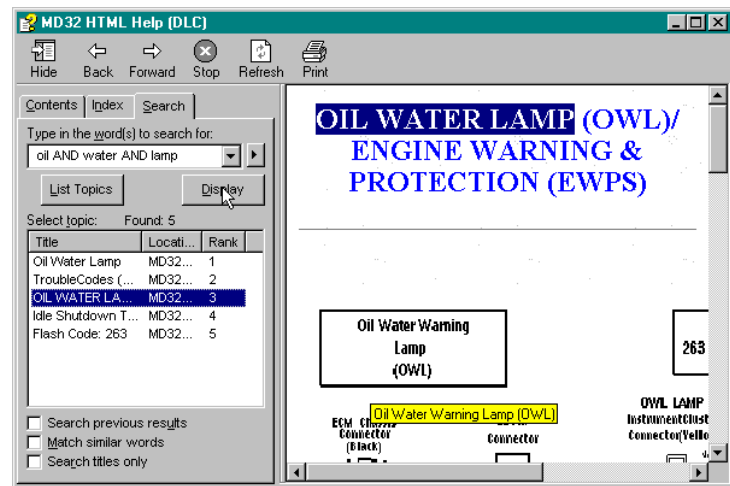
Click on the tab labeled **Search**; one can search help by using specific words or phrases.



Use the advanced search features by making conditional searches.



Type in the words or phrases in the search box and click on the  button. Select the topic and then click on the  button to display the help information.



### 13. SYSTEM AND SOFTWARE TROUBLE SHOOTING

1. If you have lost the sessions that were provided by the install disks and you do not have the install disks any more, please use the Windows copy function to retrieve the lost file. The back up copy of the session files is located in the **Factory** folder.
2. If the communication link has failed, please follow the steps outlined below.

Note: The following steps are recommended only for PC to Navistar Truck Interface cable (ZTSE4444), Navistar EZ-Tech Interface cable (ZTSE4444A), or International EZ-Tech Interface cable (ZTSE4444B).

- 1) The interface cable must be connected prior to executing the MasterDiagnostics software. Exit the software, connect the cable, then run the software again. Make certain that the correct communication port is selected in the software. Please go to step 2 if still unable to communicate on the ATA data link.
- 2) Disconnect and reconnect the interface cable from the truck's diagnostic connector (Deutsch connector). Make sure the interface cable is secure on both the truck's diagnostic connector and the PC communication (COM) port. Attempt to run the software again. Please go to step 3 if still unable to communicate on the ATA data link.
- 3) If the "Power ON/OFF" indicator is not lit, the truck battery may be low or the truck wiring harness may be faulty. For 6 pin Deutsch connector, check voltage between pin C (VBAT) and pin E (GND) on the truck's diagnostic connector. For 9-pin Deutsch connector, check voltage between pin B (VBAT) and pin A (GND) on the truck's diagnostic connector. If the voltage is 9V DC or greater, please replace the interface cable.


If the "Power ON/OFF" indicator is lit, then go to step 4 if "ATA" (for Navistar EZ-Tech Interface cable or International EZ-Tech cable) or "RXD" (for PC to Navistar Truck Interface cable) indicator is flashing red; if neither indicators on the interface cable are flashing, then go to step 5.

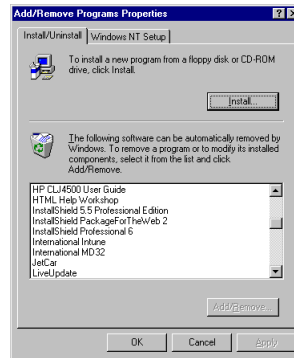
- 4) Try connecting to another PC communication port and/or use another serial cable. Change the settings in the software to open the new selected communication port. Replace the interface cable if still unable to communicate on the ATA data link.
- 5) Check if the key switch is turned on. Replace the interface cable if key switch was turned on.

### 3. Software installation problem using CD-ROM

Use the Windows control panel to install the software. Click on the Start button in the lower left-hand corner of the screen. Click on the option labeled Settings. Click on the Control Panel folder. Locate and double click on the icon




Click on  to have Windows automatically locate the CD-ROM to initiate the install process.

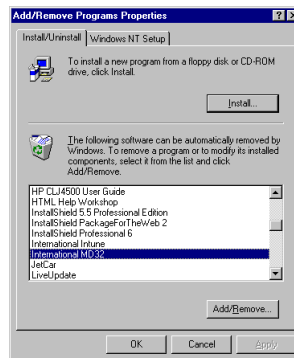


### 4. To Un-Install the software

Use the Windows control panel to un-install the software. Locate and double click on the icon



Click on the application to be removed in the list and click on  to have Windows remove the software.



## IV APPENDIX

### 1. PARAMETER LIST

First part of this section lists the symbols in alphabetical order with PID, Metric unit and SAE unit information. Second part of this section gives a short description of each parameter.

| <b>SYM</b> | <b>Parameter</b>   | <b>PID</b> | <b>Metric</b> | <b>SAE</b> |
|------------|--------------------|------------|---------------|------------|
| ACD        | AC Demand          | 154        | -             | -          |
| AFP        | Air Filter Pres    | 107        | kPa           | in water   |
| AIP        | Air Inlet Pres     | 106        | kPa           | psi        |
| ALCR       | Alternator Current | 115        | A             | A          |
| ALV        | Alternator Volt    | 167        | V             | V          |
| APS        | Accel Pedal        | 91         | %             | %          |
| APSV       | APS signal volts   | 7          | V             | V          |
| ASP        | Air Start Pres     | 82         | kPa           | psi        |
| BAP        | Baro Pres          | 108        | kPa           | psia       |
| BAPV       | BAP signal volts   | 10         | V             | V          |
| BRK1       | Engine Brake #1    | 62         | -             | -          |
| BRK2       | Engine Brake #2    | 62         | -             | -          |
| CC         | Cruise Ctrl Mode   | 85         | -             | -          |
| CCAS       | CC: Accel Switch   | 85         | -             | -          |
| CCBS       | CC: Brake Switch   | 85         | -             | -          |
| CCCS       | CC: Clutch Switch  | 85         | -             | -          |
| CCCS       | CC: Coast Switch   | 85         | -             | -          |
| CCLO       | Cruise Low Limit   | 88         | km/hr         | mph        |
| CCHI       | Cruise High Limit  | 87         | km/hr         | mph        |
| CCRS       | CC: Resume Switch  | 85         | -             | -          |
| CCSS       | CC: Set Switch     | 85         | -             | -          |
| COO        | Cruise On/Off      | 85         | -             | -          |
| CCST       | Cruise Set Speed   | 86         | km/hr         | mph        |
| CID        | Component ID       | 243        | -             | -          |
| CLP        | Clutch Pres        | 123        | kPa           | psi        |
| COL        | Change Oil Lamp    | 154        | -             | -          |
| EBP        | Exhaust Back Pres  | 129        | -             | -          |
| EBPV       | EBP signal volts   | 6          | V             | V          |

| <b>SYM</b> | <b>Parameter</b>     | <b>PID</b> | <b>Metric</b> | <b>SAE</b> |
|------------|----------------------|------------|---------------|------------|
| EBPD       | EBP Desired          | 133        | -             | -          |
| ECI        | Engine Crank Inhibit | 154        | -             | -          |
| ECL        | Coolant Level        | 111        | %             | %          |
| ECP        | Coolant Pres         | 109        | kPa           | psi        |
| ECP        | Crank Case Pres      | 101        | kPa           | psi        |
| ECT        | Coolant Temp         | 110        | deg C         | deg F      |
| ECTV       | ECT signal volts     | 1          | V             | V          |
| EFAN       | Engine Fan           | 154        | -             | -          |
| EGRP       | EGR Valve Position   | 27         | %             | %          |
| EGRV       | EGRP signal volts    | 14         | V             | V          |
| EL %       | Engine Load          | 92         | %             | %          |
| EOL        | Engine Oil Level     | 98         | %             | %          |
| EOP        | Engine Oil Pres      | 100        | kPa           | psig       |
| EOPV       | EOP signal volts     | 4          | V             | V          |
| EOT        | Engine Oil Temp      | 175        | deg C         | deg F      |
| EOTV       | EOT signal volts     | 2          | V             | V          |
| EPR%       | EPR Duty Cycle       | 130        | %             | %          |
| EPSV       | EPS signal volts     | 9          | V             | V          |
| EXT        | Exhaust Temp         | 173        | deg C         | deg F      |
| FECN       | Ave Fuel Econ        | 185        | km/L          | mpg        |
| FFP        | Fuel Filter Pres     | 95         | kPa           | psi        |
| FL         | Fuel Level           | 96         | %             | %          |
| FP         | Fuel Pres            | 94         | kPa           | psi        |
| FR         | Fuel Rate            | 183        | L/hr          | gal/hr     |
| FT         | Fuel Temp            | 174        | deg C         | deg F      |
| FUEL       | Total Fuel Used      | 250        | L             | gal        |
| FW         | Fueling Pulse width  | 132        | usec          | usec       |
| GSP        | Gas Supply Pres      | 159        | kPa           | psi        |
| GVDP       | Governor Droop       | 113        | rpm           | rpm        |
| HPG        | Hydra Pres Gov       | 155        | -             | -          |
| HOURL      | Engine Hours         | 247        | hr            | hr         |
| HMI        | Hydra Pres Mode      | 155        | -             | -          |
| HPS        | Aux Pump Pres        | 73         | kPa           | psi        |
| IAT        | Intake Air Temp      | 171        | deg C         | deg F      |

| <b>SYM</b> | <b>Parameter</b>   | <b>PID</b> | <b>Metric</b> | <b>SAE</b> |
|------------|--------------------|------------|---------------|------------|
| IATV       | IAT signal volts   | 3          | V             | V          |
| ICP        | Inject Ctrl Pres   | 164        | Mpa           | psig       |
| ICPV       | ICP signal volts   | 5          | V             | V          |
| ICPD       | ICP Desired        | 134        | -             | -          |
| ICT        | Intercooler Temp   | 52         | deg C         | deg F      |
| IDLE       | Low Idle Speed     | 188        | rpm           | rpm        |
| IMP        | Inject Meter Pres  | 157        | kPa           | psi        |
| IMT        | Intake Man Temp    | 105        | deg C         | deg F      |
| ISA        | Idle SD Alert      | 71         | -             | -          |
| ISD        | Idle SD Occurred   | 71         | -             | -          |
| ISE        | Idle SD Enable     | 71         | -             | -          |
| ISO        | Idle SD Override   | 71         | -             | -          |
| IST        | Idle SD Active     | 71         | -             | -          |
| ITP        | Inject Timing Pres | 156        | kPa           | psi        |
| IVCR       | Battery Current    | 114        | A             | A          |
| IWPV       | IVPWR signal volts | 12         | V             | V          |
| IPR%       | IPR Duty Cycle     | 131        | %             | %          |
| MAP        | Boost Pres         | 102        | kPa           | psig       |
| MAPV       | MAP signal volts   | 11         | V             | V          |
| MATV       | MAT signal volts   | 13         | V             | V          |
| ODOM       | Odometer           | 245        | km            | miles      |
| OFP        | Oil Filter Pres    | 99         | kPa           | psi        |
| OTQ        | Output Torque      | 93         | N-m           | lb-ft      |
| POT        | PTO Oil Temp       | 90         | deg C         | deg F      |
| PTAS       | PTO: Accel Switch  | 89         | -             | -          |
| PTBS       | PTO: Brake Switch  | 89         | -             | -          |
| PTCS       | PTO: Clutch Switch | 89         | -             | -          |
| PTCS       | PTO: Coast Switch  | 89         | -             | -          |
| PTO        | PTO Ctrl Mode      | 89         | -             | -          |
| PSET       | PTO Set RPM        | 187        | rpm           | rpm        |
| PTRS       | PTO: Resume Switch | 89         | -             | -          |
| PTSS       | PTO: Set Switch    | 89         | -             | -          |
| POO        | PTO On/Off         | 89         | -             | -          |
| REF#       | Reference Number   | 240        | -             | -          |

| <b>SYM</b> | <b>Parameter</b>     | <b>PID</b> | <b>Metric</b> | <b>SAE</b> |
|------------|----------------------|------------|---------------|------------|
| RPM        | Engine Speed         | 190        | rpm           | rpm        |
| RPPT       | Rem Preset PTO       | 155        | -             | -          |
| RPS        | Remote Throttle      | 155        | -             | -          |
| RPSV       | RPS signal volts     | 8          | V             | V          |
| RSE        | Radiator Shutter     | 154        | -             | -          |
| RTDR       | Retarder Percent     | 122        | %             | %          |
| RTHP       | Rated HP             | 166        | kW            | hp         |
| RTN        | Rated Engine RPM     | 189        | rpm           | rpm        |
| RVPT       | Rem Var PTO          | 155        | -             | -          |
| TBN        | Turbo Speed          | 103        | rpm           | rpm        |
| TBOP       | Turbo Oil Pres       | 104        | kPa           | psi        |
| TBOT       | Turbo Oil Temp       | 176        | deg C         | deg F      |
| TIP        | Trap Inlet Pres      | 81         | kPa           | In Hg      |
| TPS        | Throttle Pos         | 51         | %             | %          |
| TQL        | Torque Limit         | 68         | %             | %          |
| TQS        | Torque Select        | 154        | -             | -          |
| TRAN       | TransShaft Speed     | 191        | rpm           | rpm        |
| TRPF       | Trip Fuel            | 182        | L/hr          | gal/hr     |
| TSA        | Two Speed Axle       | 69         | -             | -          |
| VBAT       | Battery Volt         | 168        | V             | V          |
| VDOF       | VGT Duty Offset      | 135        | %             | %          |
| VIN        | Vehicle ID           | 237        | -             | -          |
| VOO        | Retarder On/Off      | 62         | -             | -          |
| VRE        | Retarder Active      | 121        | -             | -          |
| VS         | Vehicle Speed        | 84         | km/hr         | mph        |
| VSMX       | Max Vehicle Speed    | 74         | km/hr         | mph        |
| VSLM       | Speed Limiter Active | 83         | -             | -          |
| WSHL       | Washer Level         | 80         | %             | %          |



| Parameter          | Description   |
|--------------------|---|
| Accel Pedal        | Percent Accelerator Pedal Position -- Ratio of actual accelerator pedal position to maximum pedal position.   |
| AC Demand          | Air Conditioner Demand Switch status.   |
| Air Filter Pres    | Air Filter differential Pressure -- Change in engine air system pressure measured after the filter due to accumulation of solid foreign matter on or in the filter. |
| Air Inlet Pres     | Air Inlet Pressure – Absolute air pressure at inlet to intake manifold or air box.  |
| Air Start Pres     | Air Start Pressure – Gage pressure of air in an engine starting system that utilizes compressed air to provide the force required to rotate the crankshaft.         |
| Alternator Current | Alternator Current – Measure of electrical flow from the alternator.  |
| Alternator Volt    | Alternator Potential (Voltage) -- Measured electrical potential of the alternator.  |
| APS Signal Volts   | APS Signal Volts -- Accelerator pedal position sensor signal voltage.   |
| Aux Pump Pres      | Auxiliary Water Pump Pressure -- Gage pressure of auxiliary water pump driven as a PTO device.  |
| Ave Fuel Econ      | Average Fuel Economy -- Average of instantaneous fuel economy for that segment of vehicle operation of interest.  |
| BAP Signal Volts   | BAP Signal Volts – Barometric pressure sensor signal voltage.   |
| Baro Pres          | Barometric Pressure – Absolute air pressure of the atmosphere.  |
| Battery Current    | Net Battery Current – Net flow of electrical current into/out of the battery or batteries.  |
| Battery Volt       | Battery Potential (Voltage) -- Measured electrical potential of the battery.  |
| Boost Pres         | Boost Pressure -- Gage pressure of air measured downstream on the compressor discharge side of the turbocharger.  |
| CC: Accel Switch   | State of the cruise control accel switch: 0 indicates OFF, 1 indicates ON.  |
| CC: Brake Switch   | State of the brake switch: 0 indicates OFF, 1 indicates ON.   |
| CC: Clutch Switch  | State of the clutch switch: 0 indicates OFF, 1 indicates ON.  |
| CC: Coast Switch   | State of the cruise control coast switch: 0 indicates OFF, 1 indicates ON.  |
| CC: Resume Switch  | State of the cruise control resume switch: 0 indicates OFF, 1 indicates ON  |

| Parameter            | Description  |
|----------------------|--|
| CC: Set Switch       | State of the cruise control set switch: 0 indicates OFF, 1 indicates ON.   |
| Change Oil Lamp      | State of the electronic change oil indicator: 0 indicates no need to change oil, 1 indicates time to change oil. |
| Clutch Pres          | Clutch Pressure -- Gage pressure of oil within a wet clutch.   |
| Component ID         | Used to identify the make model and the serial number of any component of the vehicle.                           |
| Coolant Level        | Coolant Level -- Ratio of volume of liquid found in engine cooling system to total cooling system volume.        |
| Coolant Pres         | Coolant Pressure -- The gage pressure of liquid found in engine cooling system.                                  |
| Coolant Temp         | Engine Coolant Temperature -- The temperature of liquid found in engine cooling system.                          |
| Crank Case Pres      | Crankcase Pressure -- Gage air pressure inside engine crankcase.   |
| Cruise Ctrl Mode     | State of the vehicle speed control system: 0 indicates inactive, 1 indicates active.                             |
| Cruise High Limit    | Cruise Control High Set Limit Speed -- Maximum vehicle velocity allowed at any cruise control set speed.         |
| Cruise Low Limit     | Cruise Control Low Set Limit Speed -- Lowest vehicle speed in which cruise control may be active.                |
| Cruise Set Speed     | Cruise Control Set Speed -- Value of set (chosen) velocity of velocity control system.                           |
| Cruise On/Off        | State of the cruise control ON/OFF switch: 0 indicates OFF, 1 indicates ON.                                      |
| EBP Desired          | Desired Exhaust Back Pressure.   |
| EBP Signal Volts     | EBP Signal Volts -- Exhaust back pressure sensor signal voltage.   |
| ECT Signal Volts     | ECT Signal Volts -- Engine coolant temperature sensor signal voltage.  |
| EGR Valve Position   | Exhaust Gas Re-circulation valve position.   |
| EGRV Signal Volts    | EGRV Signal Volts -- Exhaust gas re-circulation valve position sensor signal voltage.                            |
| Engine Brake #1      | Engine Retarder/Brake #1 status: 0 indicates OFF, 1 indicates ON.  |
| Engine Brake #2      | Engine Retarder/Brake #2 status: 0 indicates OFF, 1 indicates ON.  |
| Engine Crank Inhibit | Engine Crank Inhibitor status.   |
| Engine Fan           | State of the electronic engine fan control: 0 indicates OFF, 1 indicates ON.                                     |
| Engine Hour          | Total engine hour -- accumulated time of operation of engine.  |

| Parameter           | Description  |
|---------------------|--|
| Engine Load         | Percent Engine Load -- Ratio of current output torque to maximum torque available at the current engine speed.   |
| Engine Oil Pres     | Engine Oil Pressure – gage pressure of oil in engine lubrication system as provided by oil pump.   |
| Eng Oil Temp        | Engine Oil Temperature -- Temperature of engine lubricant.   |
| Engine Speed        | Engine Speed – Rotational velocity of crankshaft.  |
| EOPV Signal Volts   | EOPV Signal Volts – Engine oil pressure sensor signal voltage.   |
| EOT Signal Volts    | EOT Signal Volts – Engine oil temperature sensor signal voltage.   |
| EPR Duty Cycle      | EPR Duty Cycle – Percent of total electrical energy supplied to the exhaust backpressure regulator valve.  |
| EPS Signal Volts    | EPS Signal Volts – Electronic pressure governor feedback sensor signal voltage.  |
| Exhaust Back Pres   | Exhaust Back Pressure -- exhaust backpressure at the exhaust manifold.   |
| Exhaust Temp        | Exhaust Gas Temperature – Temperature of combustion byproducts leaving the engine.   |
| Fuel Filter Pres    | Fuel Filter Differential Pressure – Change in fuel delivery pressure measured after the filter due to accumulation of solid or semisolid matter on the filter element. |
| Fuel Level          | Fuel Level -- Ratio of volume of fuel to the total volume of fuel storage container.   |
| Fuel Pres           | Fuel Delivery Pressure -- Gage pressure of fuel in system as delivered from supply pump to the injection pump.   |
| Fueling Pulse width | Fueling Pulse width -- Duration of fuel injector activation time.  |
| Fuel Rate           | Fuel Rate -- Amount of fuel consumed by engine per unit of time.   |
| Fuel Temp           | Fuel Temperature -- Temperature of fuel entering injectors.  |
| Gas Supply Pres     | Gas Supply Pressure -- Gas supply pressure (gage) to fuel metering device.   |
| Governor Droop      | Governor Droop -- The difference between full loads rated engine speed and maximum no-load governed engine speed.  |
| Hydra Pres Gov      | State of the electronic hydraulic pressure governor control: 0 indicates OFF,  |
| Hydra Pres Mode     | Hydraulic Pressure Governor Mode Indicator status.   |
| IAT Signal Volts    | IAT Signal Volts – Intake air temperature sensor signal voltage.   |

| Parameter          | Description  |
|--------------------|--|
| ICP Desired        | Desired Injection Control Pressure.  |
| ICP Signal Volts   | ICP Signal Volts – Injection control pressure sensor signal voltage.   |
| Idle SD Alert      | Prolonged engine idle shutdown driver alert mode: 0 indicates inactive, 1 indicates active.  |
| Idle SD Occurred   | Engine shutdown by idle shutdown timer: 0 indicates NO, 1 indicates YES.   |
| Idle SD Enable     | Prolonged engine idle shutdown timer function: 0 indicates disabled in calibration, 1 indicates enabled in calibration.                                  |
| Idle SD Override   | Prolonged engine idle shutdown override: 0 indicates inactive, 1 indicates active.   |
| Idle SD Active     | Prolonged engine idle shutdown timer status: 0 indicates inactive, 1 indicates active.   |
| Inject Meter Pres  | Injector Metering Rail Pressure -- The gage pressure of fuel in the metering rail as delivered from the supply pump to the injector-metering inlet.      |
| Inject Ctrl Pres   | Injection Control Pressure -- The gage pressure of the hydraulic accumulator that powers fuel injection.   |
| Inject Timing Pres | Injector Timing Rail Pressure -- The gage pressure of fuel in the timing rail as delivered from the supply pump to the injector-timing inlet.            |
| Intake Air Temp    | Ambient Air Temperature -- Temperature of air surrounding vehicle.   |
| Intake Man Temp    | Intake Manifold Temperature -- Temperature of precombustion air found in intake manifold of engine air supply system.                                    |
| Intercooler Temp   | Engine Intercooler Temperature -- The temperature of liquid found in the engine intercooler located after the turbocharger.                              |
| IPR Duty Cycle     | IPR Duty Cycle -- Percent of total electrical energy supplied to the injection control pressure regulator valve.   |
| IVPWR Signal Volts | IVPWR Signal Volts – EECM internal power voltage   |
| Low Idle Speed     | Idle Engine Speed -- Minimum nontransient rotational velocity of crankshaft while engine is supplying power to itself and its attendant support systems. |
| MAP Signal Volts   | MAP Signal Volts – Intake manifold absolute pressure sensor signal voltage.  |
| MAT Signal Volts   | MAT Signal Volts – Intake manifold air temperature sensor signal voltage.  |
| Max Vehicle Speed  | Maximum Road Speed Limit -- Maximum vehicle velocity allowed.  |
| Odometer           | Total vehicle distance -- accumulated distance traveled by vehicle during its operation.   |

| Parameter          | Description  |
|--------------------|--|
| Oil Filter Pres    | Engine Oil Filter Differential Pressure -- Change in engine oil pressure measured after filter due to accumulation of solid or semisolid material on or in the filter. |
| Oil Level          | Engine Oil Level -- Ratio of current volume of engine sump oil to maximum required volume.   |
| Output Torque      | Output Torque -- Amount of torque available at the engine flywheel.  |
| PTO Ctrl Mode      | State of the system used to transmit engine power to auxiliary equipment: 0 indicates inactive, 1 indicates active.  |
| PTO: Accel Switch  | State of the power takeoff accel switch: 0 indicates OFF, 1 indicates ON.  |
| PTO: Brake Switch  | State of the brake switch: 0 indicates OFF, 1 indicates ON.  |
| PTO: Clutch Switch | State of the clutch switch: 0 indicates OFF, 1 indicates ON.   |
| PTO: Coast Switch  | State of the power takeoff coast switch: 0 indicates OFF, 1 indicates ON.  |
| PTO Oil Temp       | Power Takeoff Oil Temperature -- Temperature of lubricant in device used to transmit engine power to auxiliary equipment.  |
| PTO: Resume Switch | State of the power takeoff resume switch: 0 indicates OFF, 1 indicates ON.   |
| PTO: Set Switch    | State of the power takeoff set switch: 0 indicates OFF, 1 indicates ON.  |
| PTO Set RPM        | Power Takeoff Set Speed -- Rotational velocity selected by operator for device used to transmit engine power to auxiliary equipment.                                   |
| PTO On/Off         | State of the power takeoff ON/OFF switch: 0 indicates OFF, 1 indicates ON.   |
| Radiator Shutter   | State of the electronic radiator shutter control: 0 indicates OFF, 1 indicates ON.   |
| Rated HP           | Rated Engine Power -- Net brake power that the engine will deliver continuously specified for a given application at a rated speed.                                    |
| Rated Engine RPM   | Rated Engine Speed -- The maximum governed rotational velocity of the engine crankshaft under full load conditions.  |
| Reference Number   | Electronic engine calibration date reference number.   |
| Remote Throttle    | State of the power takeoff remote throttle: 0 indicates inactive, 1 indicates active.  |
| Rem Preset PTO     | State of the remote preset PTO control switch: 0 indicates OFF, 1 indicates ON.  |

| Parameter            | Description   |
|----------------------|---|
| Rem Var PTO          | State of the remote variable PTO control switch: 0 indicates OFF, 1 indicates ON.   |
| Retarder On/Off      | Vehicle retarder status: 0 indicates OFF, 1 indicates ON.   |
| Retarder Active      | State of the device used to convert engine power to vehicle retarding force: 0 indicates OFF, 1 indicates ON.   |
| Retarder Percent     | Engine Retarder Percent – Ratio of current engine retard force to maximum retard force available.   |
| RPS Signal Volts     | RPS Signal Volts – Remote pedal sensor signal voltage   |
| Speed Limiter Active | State of the system used to limit maximum vehicle velocity: 0 indicates inactive, 1 indicates active.   |
| Torque Select        | Torque Curve Selection switch status.   |
| Throttle Pos         | Throttle Position -- The position of the valve used to regulate the supply of a fluid usually air or fuel/air mixture to an engine. 0% represents no supply and 100% is full supply.                    |
| Torque Lim           | Torque Limiting Factor -- Ratio of current output torque allowed (due to adverse operating conditions) to the maximum torque available at the current engine speed (under normal operating conditions). |
| Total Fuel Used      | Total fuel used -- accumulated amount of fuel used during vehicle operation.  |
| Trans Shaft Speed    | Transmission Output Shaft Speed -- Rotational velocity of shaft transferring force from transmission to drive shaft.  |
| Trap Inlet Pres      | Particulate Trap Inlet Pressure -- Exhaust backpressure as a result of particle accumulation on filter media placed in the exhaust stream.  |
| Trip Fuel            | Trip Fuel -- Fuel consumed during all or part of a journey.   |
| Turbo Oil Pres       | Turbo Oil Pressure -- Gage pressure of oil in turbocharger lubrication system.  |
| Turbo Oil Temp       | Turbo Oil Temperature -- Temperature of turbocharger lubricant.   |
| Turbo Speed          | Turbo Speed -- Rotational velocity of rotor in turbocharger.  |
| Two Speed Axle       | Two speed axle status: 0 indicates high range, 1 indicates low range.   |
| Vehicle ID           | Vehicle identification number as assigned by the vehicle manufacturer.  |
| Vehicle Speed        | Road Speed -- Indicated vehicle velocity.   |
| VGT Duty Offset      | VGT control signal duty offset  |
| Washer Level         | Washer Fluid Level -- Ratio of volume of liquid to total container volume of fluid reservoir in windshield wash system.   |

## 2. PROGRAMMABLE PARAMETER DESCRIPTION

The programmable parameters are grouped according to control system features. Please refer to other engine service manuals for more details.

### **AMS: VGT Mode**

### **AMS: EGR Mode**

#### **AIR MANAGEMENT SYSTEM**

This group of parameters indicates the air management control on the engine: Variable Nozzle Turbine Turbo and Exhaust Gas Recirculation.

### **AUD: Calibration Download Date**

### **AUD: Calibration Tool ID**

### **AUD: Last Service Tool ID 1**

### **AUD: Last Service Tool ID 2**

### **AUD: Strategy Download Date**

### **AUD: Strategy Tool ID**

#### **AUDIT (EECM software)**

This group of parameters allows the factory and engine engineering to trace the origin and the date of programming changes through out the life of the engine electronics.

### **CC: Cruise Control High VS Limit**

### **CC: Cruise Control Low RPM Limit**

### **CC: Cruise Control Low VS Limit**

### **CC: Cruise Control Mode**

### **CC: Cruise Control VS Ramp Rate**

#### **CRUISE CONTROL**

This group of parameters customizes the cruise control feature. The purpose of the cruise control feature is to provide electronic-controlled vehicle speed regulation when the vehicle is under highway driving conditions. This feature also has the "bump up" and "bump down" functions. Wherein, the operator may "bump up" the vehicle speed in 1.0 mph increments when the Resume/Accel button is momentarily pressed. The operator may "bump down" the vehicle speed in 1.0 mph decrements when the Set/Coast button is momentarily pressed.

### **Cold Ambient Protection Mode**

This parameter customizes the cold ambient protection feature. Cold ambient protection allows the engine to idle at an elevated RPM when the coolant temperature falls below a certain point and the ambient temperature is cold. This allows the engine to warm up to the normal operating temperature.

**Coolant Surge Tank Type**

This parameter determines the type (plastic or metallic) of coolant tank installed in the vehicle.

**CDPF: Fuel Interval****CDPF: Hour Interval****CDPF: Distance Interval****CDPF: Starting Fuel Reading****CDPF: Starting Hour Reading****CDPF: Starting Odometer Reading****CDPF: Service Reset****CYTALYTIC DIESEL PARTICULATE FILTER**

This group of parameters indicates the service interval for the on board Catalytic Diesel Particulate Filter system.

**CTC: Begin Derate Temperature****CTC: Coolant Temp Compensation Mode****CTC: Derate Factor****CTC: Modify Derate Temperature****COOLANT TEMPERATURE COMPENSATION**

This group of parameters customizes the coolant temperature compensation. The purpose of Coolant Temperature Compensation is to reduce the amount of fuel delivered to the engine when the engine is running near its maximum torque fuel delivery and coolant temperature is above a programmed value. This fuel reduction has two effects: First, the heat generated by the engine is reduced thereby reducing the burden on the engine cooling system. Second, the vehicle speed will decrease. In order to maintain the vehicle speed the operator is encouraged to downshift, which will result in increased efficiency of the engine cooling system.

**ECI: Engine Crank Inhibit Mode****ECI: Engine Crank Inhibit Run Mode Time****ENGINE CRANK INHIBIT**

This group of parameters customizes the crank inhibit feature. The purpose of Engine Crank Inhibit is to prevent the operator from cranking the engine while the engine is running or the driveline is engaged. A programmable time (1-5 seconds) allows the on-board electronics from inhibit cranking for a short duration until engine speed reaches idle speed.



**EFC: Air Conditioner**

**EFC: Engine Fan Mode**

**EFC: Fan Off Temperature**

**EFC: Fan On Temperature**

**ENGINE FAN CONTROL**

This group of parameters customizes the engine fan control feature. The purpose of Engine Fan Control is to provide the proper logic to determine when the Fan should be turned on or off by energizing/de-energizing the fan drive solenoid. The purpose of engine fan is to allow a higher airflow for heat exchange between the radiator and the ambient air when needed. In addition, the engine fan may be used as a vehicle-retarding device.

**EFC: Radiator Shutter Mode**

**EFC: Shutter Close Temperature**

**EFC: Shutter Open Temperature**

**ENGINE FAN CONTROL FOR RADIATOR SHUTTER**

The purpose of Radiator Shutters Enable is to provide the proper logic to open or close the radiator shutters (energize or de-energize a solenoid). The purpose of this device is to keep the engine warm during cold weather operation. This would enable faster warm-up of the passenger cab thereby enabling faster defrost of the windshield. Fuel economy can be improved when the radiator shutters are closed.

**EFRC: Engine Family Extension**

**EFRC: Engine Family Rating Code**

**EFRC: Regulation Type**

**ENGINE FAMILY RATING CODE**

This group of parameters allows the on-board electronics to precisely control the fueling requirements based on the particular engine configuration. The on-board electronics has what is known as the Multiple Engine Rating Map. This allows a single on-board electronic controller to provide different engine configurations. Optimal control is provided for vehicles with various engine configuration and ratings: engine model, rated engine speed, rated engine power, and transmission type.

**EL: Low Coolant Hour 1**  
**EL: Low Coolant Hour 2**  
**EL: Low Coolant Odometer 1**  
**EL: Low Coolant Odometer 2**  
**EL: Low Oil Pressure Hour 1**  
**EL: Low Oil Pressure Hour 2**  
**EL: Low Oil Pressure Odometer 1**  
**EL: Low Oil Pressure Odometer 2**  
**EL: Overheat Hour 1**  
**EL: Overheat Hour 2**  
**EL: Overheat Odometer 1**  
**EL: Overheat Odometer 2**  
**EL: RPM Overspeed Hour 1**  
**EL: RPM Overspeed Hour 2**  
**EL: RPM Overspeed Odometer 1**  
**EL: RPM Overspeed Odometer 2**

**EVENT LOGGER**

This group of parameters indicates the electronic automatic engine event-logging feature. The purpose of this feature is to record the accumulated engine hours and odometer readings when certain excessive engine operating conditions occurred.

**EMD: ECM H/W Version**  
**EMD: ECM Manufacturing Date**  
**EMD: ECM S/W Calibration Version**  
**EMD: ECM S/W Strategy Version**  
**EMD: ECM Serial Number**  
**EMD: PP List Checksum**  
**EMD: PP List Level**  
**EMD: S/W Calibration Checksum**  
**EMD: S/W Strategy Checksum**

**ECM MANUFACTURING DATA**

This group of parameters provides the manufacturing data feature. The date and the serial number of the on-board electronics are indicated, as well as, the level of hardware and software.

**Engine Oil Pressure Enable**

This parameter dictates what ancillary sensors are available to the on-board electronics for additional level of electronic control. Engine Oil Pressure Signal when enabled will allow the on-board electronics to process that signal. If this sensor is available then the on-board electronics will broadcast its status via the ATA data link.

**Engine Serial Number**

This parameter is the factory programmed engine serial number, also known as the ESN.

**EPG: Driveline Mode**

**EPG: Electronic Pressure Governor Mode**

**EPG: Electronic Pressure Governor Ramp Rate**

**EPG: Integral Gain Adjust**

**EPG: Mode Indicator**

**EPG: Cavitation Operation Time**

**EPG: Proportional Gain Adjust**

**ELECTRONIC PRESSURE GOVERNOR**

This group of parameters customizes the electronic pressure governor feature. The purpose of the Electronic Pressure Governor is to provide closed loop control over an external pressure input. This feature is targeted for fluid delivery pumps, especially fire truck applications. The EPG feature also provides a loss of pressure detection. This is achieved by monitoring the hydraulic pressure, the engine speed, and the status of the EPG select switch. Once the loss of pressure is detected the EPG feature is disabled and a corresponding fault flag is set.

**EWPS: ECT Critical Temperature**

**EWPS: ECT Warning Temperature**

**EWPS: EOP Critical Level 1**

**EWPS: EOP Critical Level 2**

**EWPS: EOP Critical Level 3**

**EWPS: EOP RPM Boundary 1**

**EWPS: EOP RPM Boundary 2**

**EWPS: EOP RPM Boundary 3**

**EWPS: EOP Warning Level 1**

**EWPS: EOP Warning Level 2**

**EWPS: EOP Warning Level 3**

**EWPS: Warning/Shutdown Mode**

**ENGINE WARNING AND PROTECTION SYSTEM**

This group of parameters customizes the engine warning and protection feature. The Engine Warning and Protection System safeguards the engine from undesirable operating conditions in order to prevent engine damage and to prolong engine life. When a warning condition is detected, the on-board electronics will light up the OIL/WATER lamp and the warning buzzer is activated. When a critical condition is detected, the on-board electronics will shut down the engine if the engine warning and protection system has the protection feature enabled. After an engine shut down, the operator may re-start the engine for a thirty seconds run time if desired. The event-logging feature will also record when an excessive (i.e., critical) engine event has occurred in both engine hours and odometer readings. Currently there are four states of electronic operation: STANDARD, 3-WAY WARNING, 3-WAY PROTECTION, and 2-WAY WARNING.

**Exhaust Backpressure Control**

This parameter customizes the exhaust backpressure feature. The purpose of the exhaust backpressure device is to allow faster cab heating and window defrosting. The on-board electronics commands the exhaust backpressure device to elevate the exhaust backpressure so that the engine load is increased thereby causing the engine to work harder to expel the exhaust gas. This will cause the engine to warm up faster.

**Glow Plug Control**

This parameter customizes the glow plug feature. Glow plugs are used to improve/enhance cold-engine starting. The glow plugs are energized prior to engine cranking to warm up the cylinders. The glow plugs are turned full on if the battery voltage is normal, or pulse-width-modulated if the battery voltage is above normal. The glow plugs may continue to be energized during engine warm-up to reduce emissions. The glow plug lamp is used as a wait-to-start indicator. The glow plug lamp is lit during initial glow plug activation to indicate to the driver to wait for the engine cylinders to warm up prior to starting the engine.

**IST: Idle Shutdown Time****IST: Idle Shutdown Timer Mode****IST: Max IAT for Idle Shutdown****IST: Min IAT for Idle Shutdown****ENGINE IDLE SHUTDOWN CONTROL**

This group of parameters customizes the prolonged engine idle automatic shutdown feature. The purpose of this feature is to shut the engine down after a programmable idle time has been exceeded. This allows the reduction of fuel usage, engine wear, and emissions. Thirty (30.0) seconds before an automatic engine shutdown, the operator will be warned via the red Oil/Water Lamp. This lamp will begin flashing until the engine is shutdown. The operator may override the electronics at any time. After an engine shutdown occurs, the Oil/Water Lamp will stop flashing and a diagnostic code will be recorded. The diagnostic code is recorded to assist in diagnosing possible service complaints of the engine shutting down. Currently there are four states of electronic operation: OFF, PTO AVAILABLE, NO ENGINE LOAD, and TAMPER PROOF.

**IVPWR: Expected VBAT**

Expected operating battery voltage on the vehicle.

**PTO: In-Cab Control**  
**PTO: In-Cab Mode**  
**PTO: Max RPM**  
**PTO: Max VS**  
**PTO: Power Take Off Mode**  
**PTO: Preset RPM 1 (Set)**  
**PTO: Preset RPM 2 (Resume)**  
**PTO: Remote Pedal**  
**PTO: RPM Ramp Rate**

**POWER TAKE OFF SPEED CONTROL**

This group of parameters customizes the power take off speed control feature. Power Take Off (PTO) Speed Control provides a method for the operator to set and maintain a regulated engine speed, without using the accelerator pedal, for the purpose of operating auxiliary equipment. The power take off feature has an in-cab and a remote operator interfaces. Depending on configuration, the operator may turn on and activate PTO speed control while in the comfort of the cab or at the convenience of the remote interface. If both in-cab and remote operations are both enabled, the on-board electronics senses which interface is active depending on operator actions. No active mobile PTO operation is possible when the PTO speed control is turned on using the remote interface. This feature also has the "bump up" and "bump down" functions. Wherein, the operator may "bump up" the RPM in 25 RPM increments when the Resume/Accel button is momentarily pressed. The operator may "bump down" the RPM in 25 RPM decrements when the Set/Coast button is momentarily pressed.

**Pulses Per Mile 1**  
**Pulses Per Mile 2**  
**Rear Axle Ratio 1**  
**Rear Axle Ratio 2**  
**Tire Revs**  
**Transmission Gear teeth**  
**Transmission Top Gear Ratio**

**TWO SPEED AXLE**

This group of parameters is used by the on-board electronics to determine the vehicle speed calculations.

**Rated Horsepower****RPM: High Idle Setpoint****RPM: Low Idle Setpoint****RPM: Rated Speed Setpoint****TRANSMISSION TYPE**

This group of parameters allows the on-board electronics to precisely control the fueling requirements based on the particular engine configuration. The on-board electronics have what is known as the Multiple Engine Rating Map. This allows a single on-board electronic controller to provide different engine configurations. Optimal control is provided for vehicles with various engine configuration and ratings: engine model, rated engine speed, rated engine power, and transmission type.

**RSL: Maximum Vehicle Speed****RSL: Road Speed Limiting Mode****RSL: RPM Limit with VSS Fault****ROAD SPEED LIMITING**

This group of parameters customizes the road speed-limiting feature. Road Speed Limiting is used by the on-board electronic for electronic maximum road speed governing. If the vehicle's maximum road speed exceeds the programmed maximum vehicle speed limit, the on-board electronics will reduce or cut-off fueling. This feature is primarily for improving fuel economy.

**Shift Schedule**

This parameter determines how and when the EECM will request the electronic transmission controller for up-shifts and downshifts.

**SI: Change Oil Lamp On Mode****SI: Change Oil Lamp On Time****SI: Distance Interval****SI: Fuel Interval****SI: Hour Interval****SI: Service Interval Mode****SI: Service Interval Reset****SI: Service Soon Percent****SI: Starting Fuel Reading****SI: Starting Hour Reading****SI: Starting Odometer Reading****SERVICE INTERVAL**

This group of parameters customizes the Service Interval feature. Service Interval allows the truck owner to customize when a truck requires servicing as in changing oil. When the programmed distance or engine hour has been reached the Change Oil Lamp will be lit to indicate its time for maintenance and service.

**TC: Traction Control Mode****TRACTION CONTROL**

This parameter determines how and when the EECM will activate its electronic traction control.

**TLT: Lower N/VS Ratio****TLT: Torque Level Tailoring Mode****TLT: Upper N/VS Ratio****TORQUE LEVEL TAILORING**

This group of parameters customizes the torque level-tailoring feature. The torque level-tailoring feature allows the on-board electronics to control the engine based on the possible driving situation. A typical application for this feature is a vehicle with an on-highway and an off-highway torque curves.

**Total Engine On Time****Total Fuel Used****Total Miles**

This group of parameters indicates the vehicle accumulator data. The purpose of the Accumulators feature is to record the total engine hours, the total fuel used, and the total vehicle miles. This system requirement is intended to track engine operation for scheduled preventive maintenance and as an aid to warranty administration.

**Total Tattletale**

This is an internal EECM programming tracking mechanism.

**Vehicle Retarder Mode**

This parameter indicates the vehicle retarder type and its mode of operation.

**Vehicle Speed Signal Selection**

This parameter customizes the vehicle speed signal feature.

**VIN****VEHICLE IDENTIFICATION**

This parameter is the factory programmed vehicle identification number.

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