

NAVPAK
Diagnostic Software
User's Manual



A NAVISTAR COMPANY

NEXIQ
TECHNOLOGIES™

NAVPAK Diagnostic Software

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General Information

This manual has been written specifically for the NAVPAK Diagnostic Software for International[®] DLC I, II, and III engine controllers. This manual gives a brief explanation of the diagnostic tool and its functions. It was written for the user who has a working knowledge of Windows[®] XP and Vista operating systems, their conventions, how to use a mouse, standard menus, commands, and how to Open, Save, and Close files.

Screen illustrations are used throughout this manual, taken from Windows[®] XP, to help clarify use and functions. For help with any of these techniques please refer to your Windows[®] Help documentation.

Please take the time to study this manual and become familiar with the features and functions of the NAVPAK Diagnostic Software. In order to use this tool correctly, this manual, the appropriate engine User's Handbook, and the Workshop Manual should be used together.

Danger is indicated by two methods:

Warning! This indicates that there is a possible danger to the person.

Caution: This indicates that there is a possible danger to the engine.

Note: If you require additional help with the installation procedures in this manual contact NEXIQ Customer Support at:

**Snap-on
2950 Waterview
Rochester Hills, MI 48309
USA**

1-877-905-6716

1.0 Installation Instructions

This program was developed to run on Windows® XP and Vista.

Note: Before beginning installation of your NAVPAK Diagnostic Software it is strongly recommended that you exit all Windows® programs.

If you have a previous version of this diagnostic software installed, you must uninstall it before commencing **Authorization** and **Installation** of the current version (see Section 11 of this manual).

- 1) Insert CD into the CD-ROM.
- 2) If Auto run is enabled on your PC/Laptop, the installation will begin automatically.
- 3) Windows® displays a startup screen.
- 4) Click **Next** to continue installation.

Follow the on-screen instructions. You must contact NEXIQ Technologies™ Customer Support to acquire an Authorization Code, to proceed with the installation.

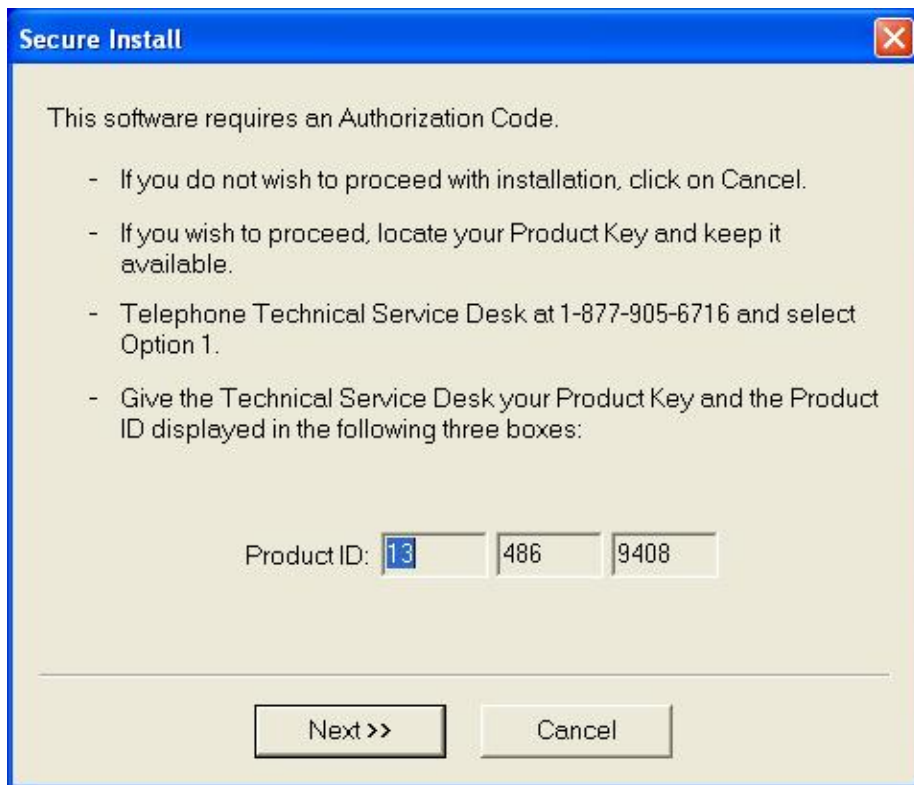


Figure 1.1

- 5) Tell the Customer Support specialist the **Product ID number** that appears on your screen.

Important! Give the number in the three groups as it appears on the screen. Do not cancel from this screen unless you wish to restart the install and authorization process. Each time you start the software installation the Product ID number will change.

- 6) Follow directions given by the Customer Support specialist. He or she will instruct you to click on the **Next** button.

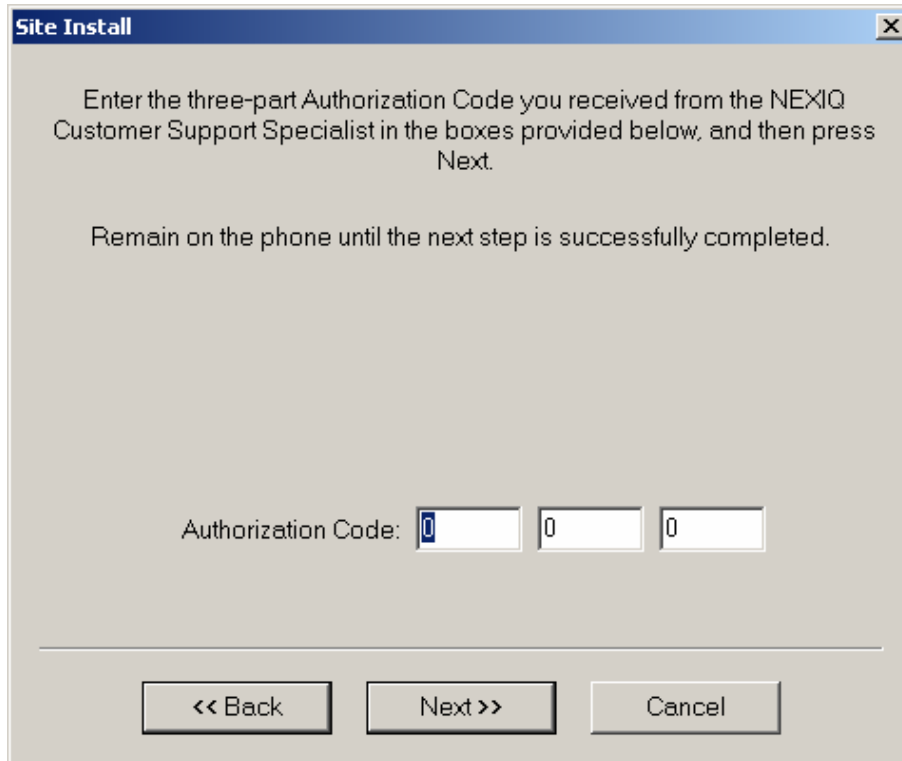


Figure 1.2

- 7) Enter the **Authorization Code** in the spaces provided. Use the Tab key to move between the boxes.

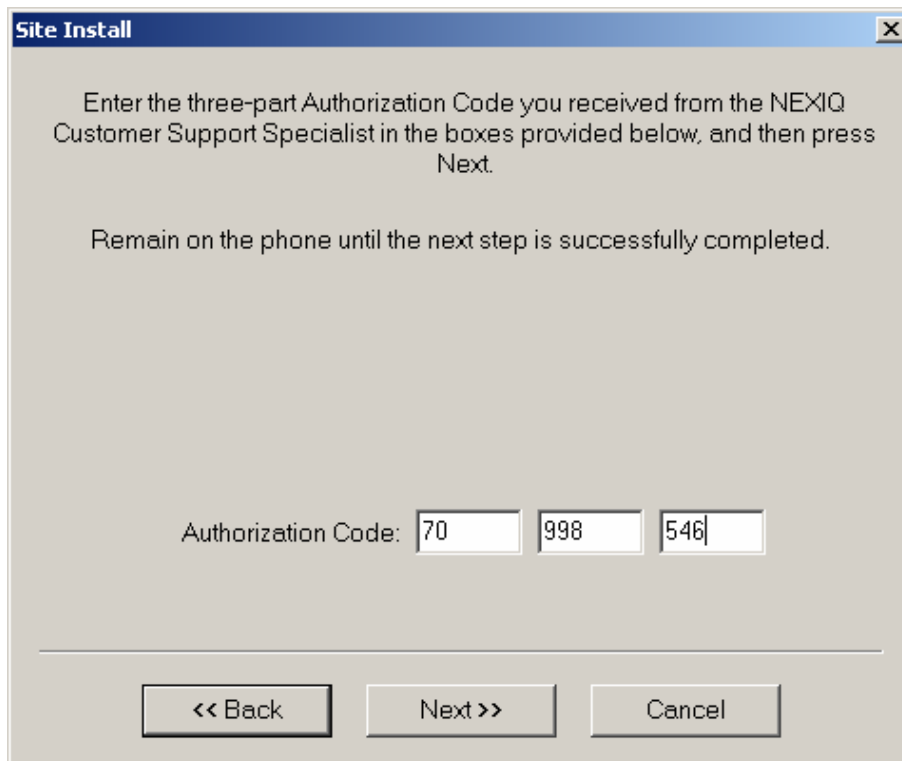


Figure 1.3

- 8) Click **Next** when instructed by the Customer Support specialist.

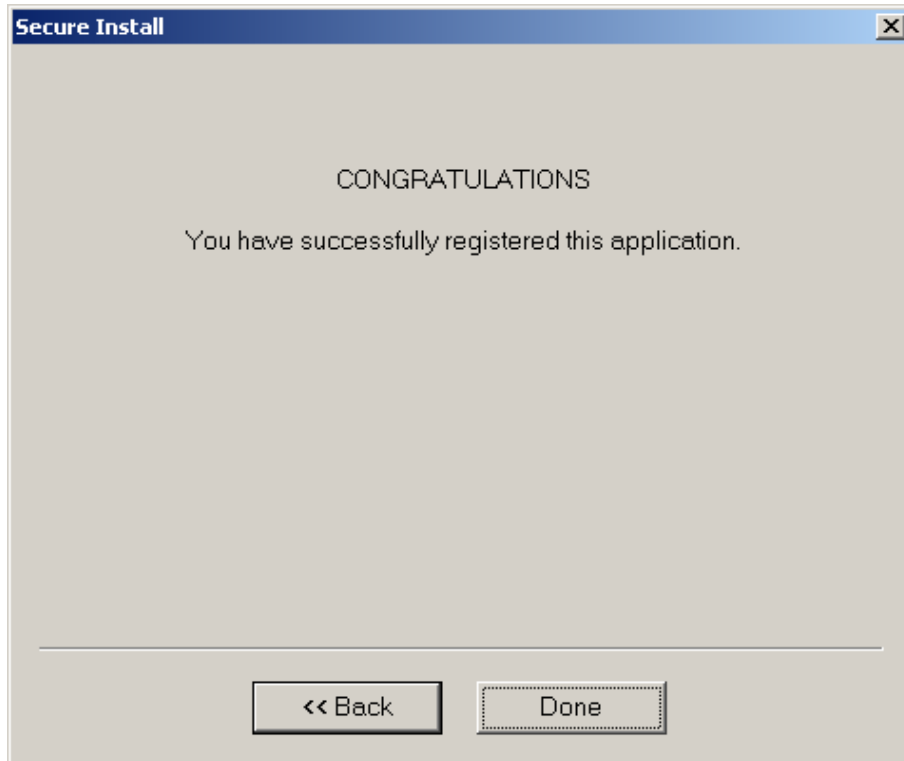


Figure 1.4

- 9) Click **Done**.

The **Authorization/Registration** procedure is now complete. The **next step** is the **Installation** and setup of the NAVPAK Diagnostic Software application. The following screen is automatically displayed:

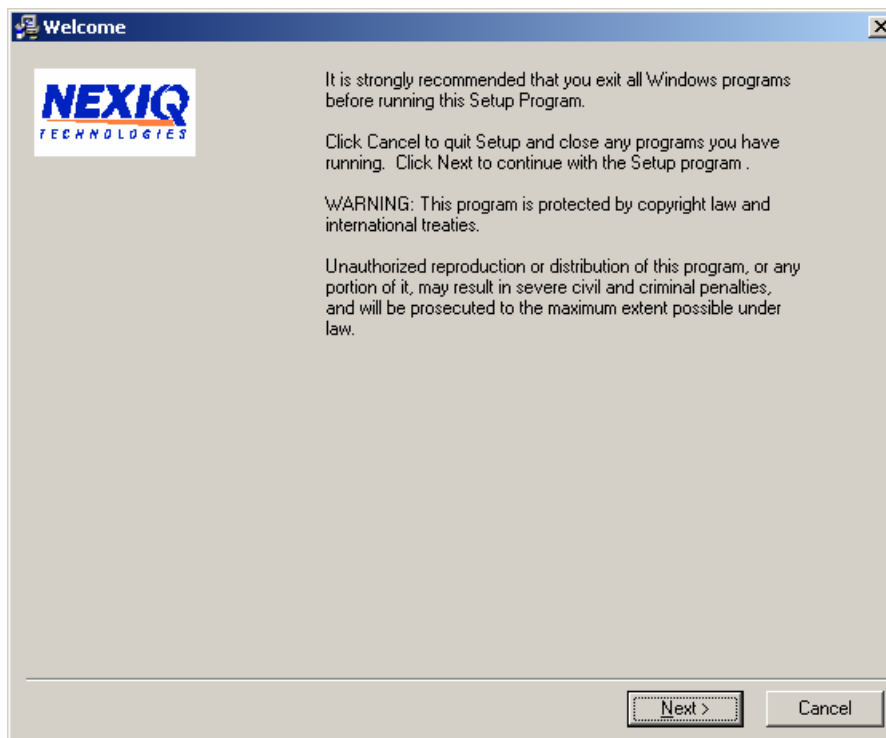


Figure 1.5

10) Click **Next** to continue with the installation.

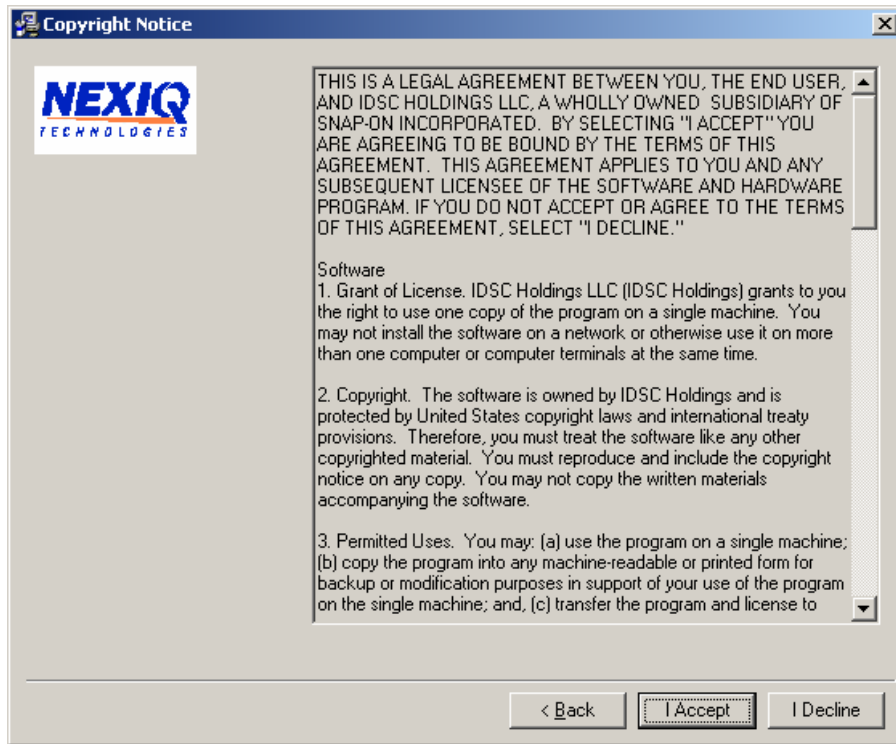


Figure 1.6

11) Read the **Copyright Notice**.

12) Click **I Accept** to continue, or **I Decline** if you do not wish to proceed.

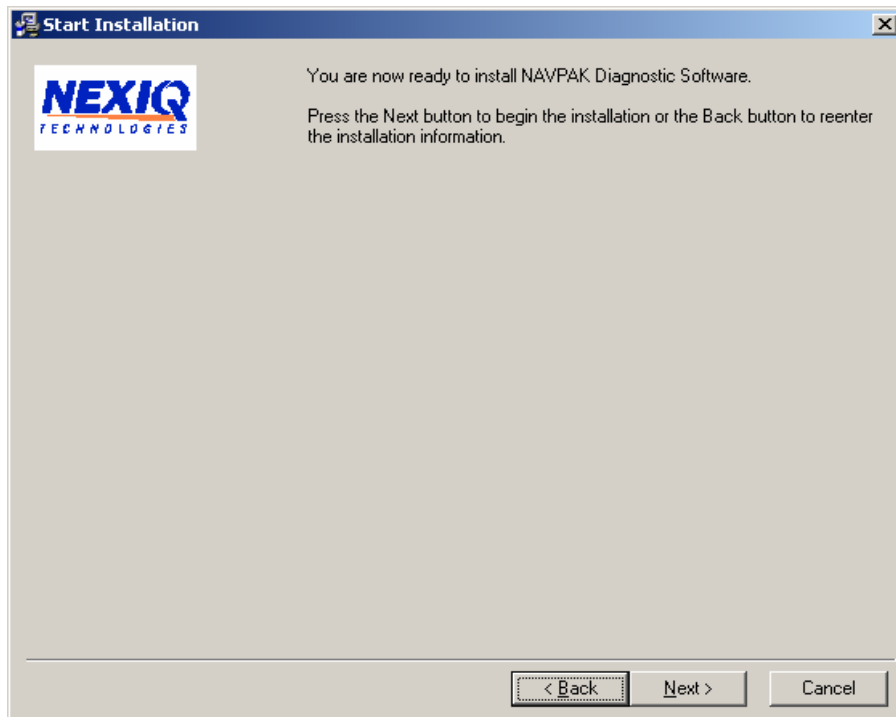


Figure 1.7

13) Click **Next**.

The Installation Complete window is displayed.

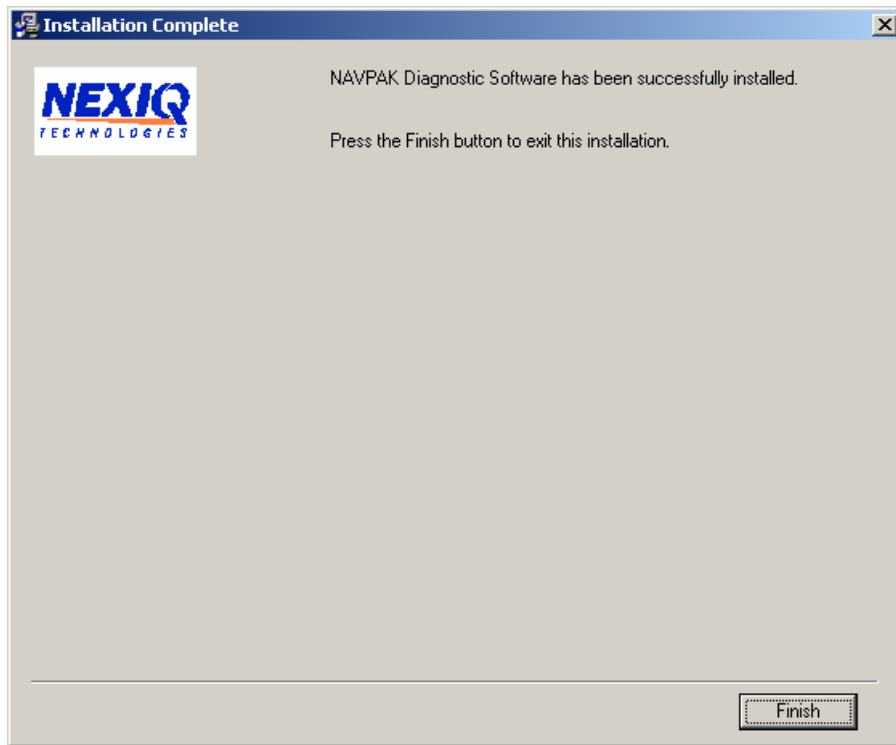


Figure 1.8

- 14) Click **Finish**.

The following dialog is displayed.



Figure 1.9

- 15) Click **OK**.
- 16) Insert the USB-Link™ drivers CD and follow the prompts to install the drivers.

Please refer to the *NEXIQ Technologies™ USB-Link™ Installation and Setup Manual* for additional assistance with the installation of these drivers.

2.0 Starting and Using NAVPAK Diagnostic Software

Note: If you have not already done so, install the USB-Link™ drivers at this time.

2.1 Connecting the Hardware

Connect the USB-Link™ to the diagnostic port of the engine and to the computer as indicated in the following illustration:

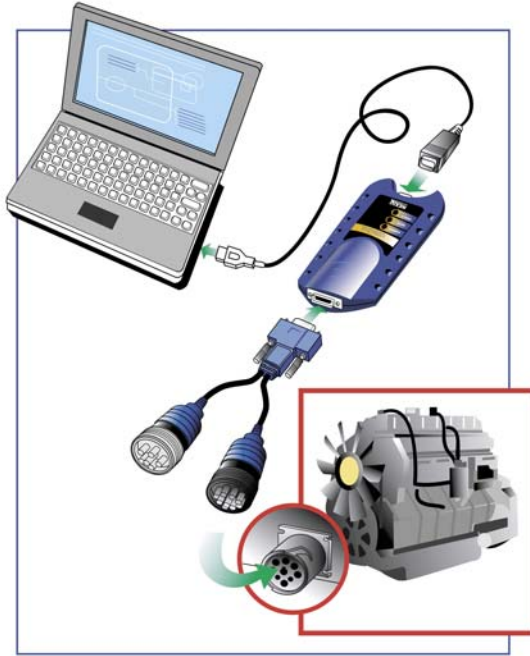


Figure 2.1

Turn the engine key on and check that the Power light on the Data Module is on.

2.2 Starting the Software Program

- 1) Start the computer.
- 2) Select **Start ▶ Programs ▶ NAVPAK Diagnostic Software ▶ NAVPAK Diagnostic Software**.

The International[®] splash screen is briefly displayed.

Note: Prior to connecting to a vehicle, you must first select an adapter. Once you have made your selection, you don't have to perform this task again unless you wish to change adapters.

- 3) Select **Options...** from the Menu bar.

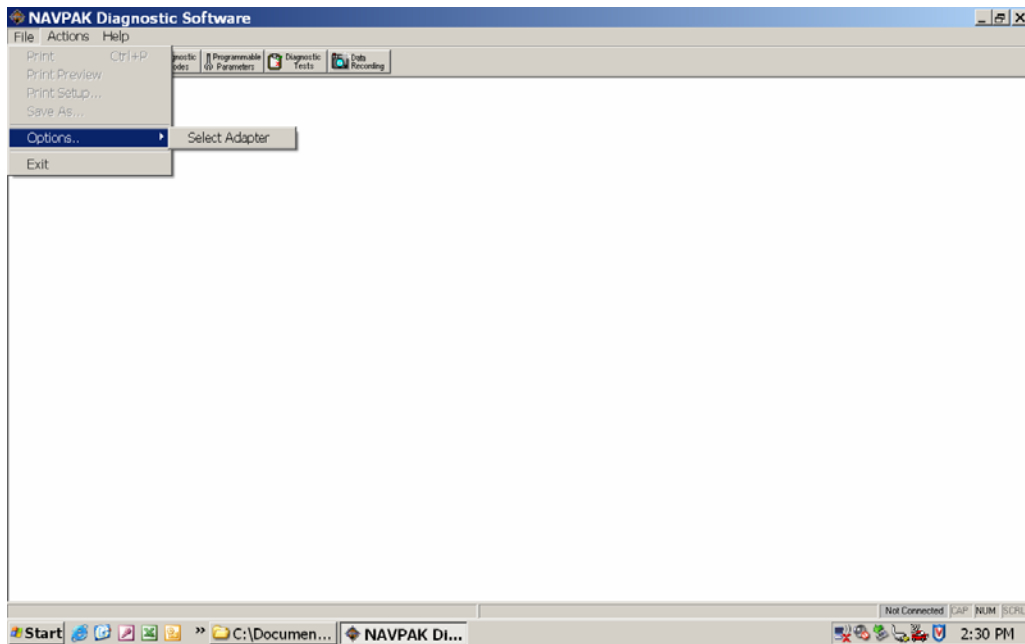


Figure 2.2

- 4) Click **Select Adapter**.
The **Select Communications Adapter** dialog is displayed.
- 5) Select an adapter from the drop-down list (e.g. **USB-Link J1708**).

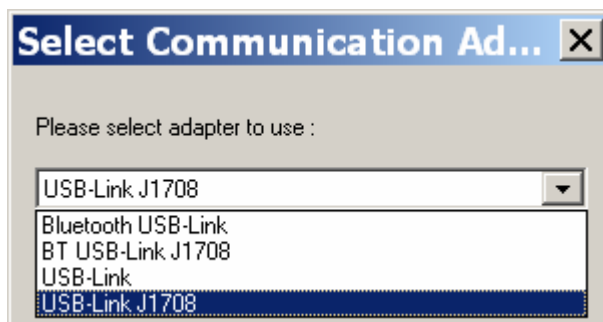


Figure 2.3


Note: The list contains all the J1708 drivers installed on your PC.

- 6) Click **Select**.
- 7) Click  **Connect** on the toolbar.

Note: Your connection status is provided in the status bar (located in the lower right corner of the screen). If you are not connected, the status bar displays **Not Connected**. If you are connected, the status display changes to green and the status bar displays **Online Mode**.

If you try to select any of the menu items prior to connecting to the vehicle, the following message is displayed:

Please connect to the Vehicle!







Click **OK**, and connect to the vehicle by clicking  on the toolbar.

Note: If you cannot start the application, contact NEXIQ Technologies™ Customer Support at:

NEXIQ Technologies™
2329 E. Walton Blvd.
Auburn Hill, MI 48326

(800) 639-6774 (within the United States)
(248) 232-6610 (for international support)

8) Once connected, select from the following options by clicking on a toolbar button, or click on the Actions menu to display a drop-down list of available options:

-  Disconnect Connect/Disconnect (a toggle)
-  Data Lists Data Lists
-  Diagnostic Codes Diagnostic Codes
-  Programmable Parameters Programmable Parameters
-  Diagnostic Tests Diagnostic Tests
-  Data Recording Data Recording

Note: When you connect, the application automatically opens the Diagnostic Codes screen, displaying any Active and Inactive codes.

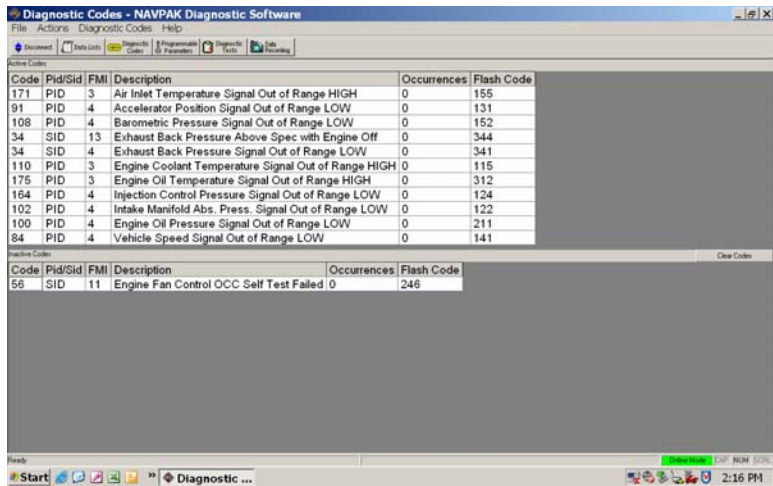


Figure 2.4

2.3 Menu Bar

Menu bar options enable you to perform the following tasks while working with the NAVPAK Diagnostic Software.

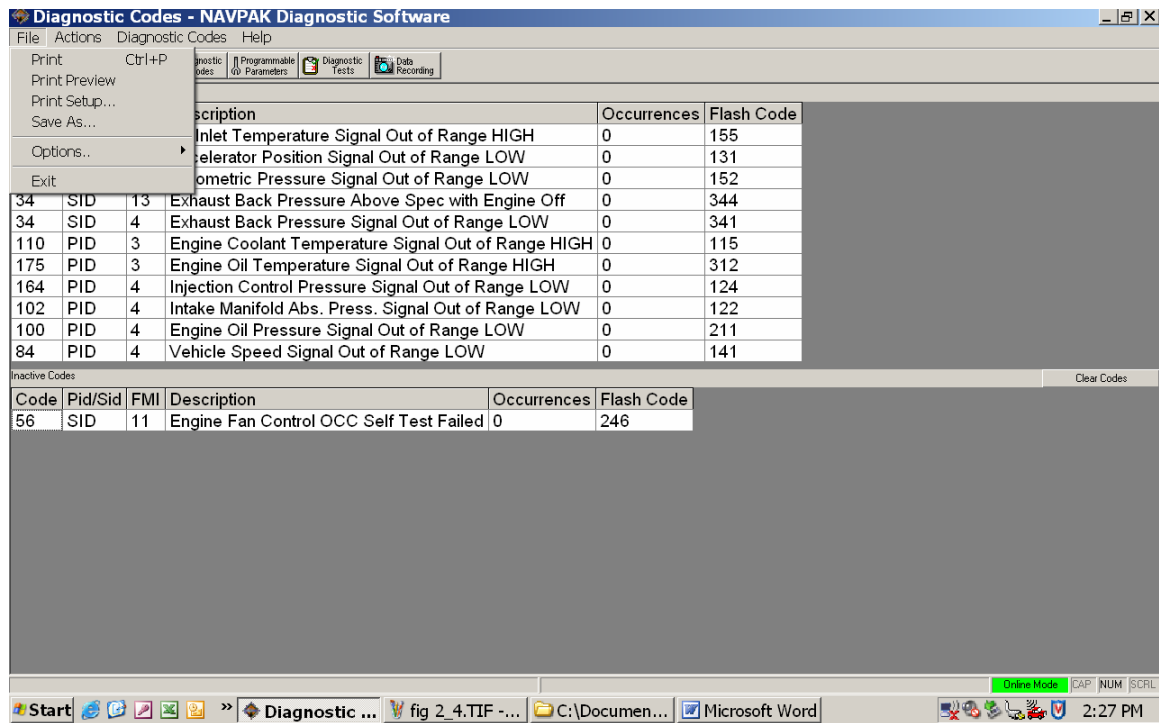


Figure 2.5

File - enables you to perform the following functions:

- Print
- Print Preview
- Print Setup...
- Save As...
- Options... (used to access the Selecting an Adapter feature)
- Exit

Actions - displays and launches the following application menu options:

- Connect/Disconnect (a toggle)
- Data List
- Diagnostic Codes
- Programmable Parameters
- Diagnostic Tests
- Data Recording







Note: The Actions menu options are also available from icons on the toolbar.

Help - provides online help topics, as well as version information about the NAVPAK software application.

Note: As you use the application, the menu bar expands to include the active menu option. For example, when Diagnostic Codes are displayed, a Diagnostic Codes menu appears on the menu bar.

2.4 The Toolbar

The toolbar (located at the top of the NAVPAK screen, just below the menu bar), provides quick access to the following options:

-  Connect Connect/Disconnect (a toggle)
-  Data Lists Data Lists
-  Diagnostic Codes Diagnostic Codes
-  Programmable Parameters Programmable Parameters
-  Diagnostic Tests Diagnostic Tests
-  Data Recording Data Recording

To quickly access any of the options, click on the icon in the toolbar.

Note: Each of these options is also accessible from the Actions menu.

2.5 Save As

The **Save As** option (located on the File menu) enables you to Save, or Export, the following to a csv file:

- Data Lists
- Diagnostic Codes
- Programmable Parameters

The resulting .csv file can be opened in a spreadsheet application such as MS Excel or Lotus 1-2-3 for analysis at a later time.

Export files will be saved in the root directory using the following default filenames:

- Data list Export file dMMDD_hhmmss.csv
- Diagnostic Code Export file cMMDD_hhmmss.csv
- Programmable Parameters Export file pMMDD_hhmmss.csv

The first letter of the filename denotes the type of data saved, MMDD is the month and day, and hhmmss the time in hours, minutes and seconds that the file was created.

The file layouts are described later in this manual under the relevant sections.


3.0 Data Lists

A Data List is a list of fixed or variable data items monitored by the ECM.

The following Data Lists are available:

- General Engine
- Air Conditioning
- Coolant System
- Cruise Control
- Engine Brake
- Idle Shutdown
- Pressures
- Glow Plugs
- Fuel System
- PTO
- Trip Info
- EGR
- Temperatures
- Sensor Volts
- Other

To launch Data Lists:

- 1) Click on  located on the toolbar (or select **Data Lists** from the Actions menu).

The **Select Data List** window is displayed.

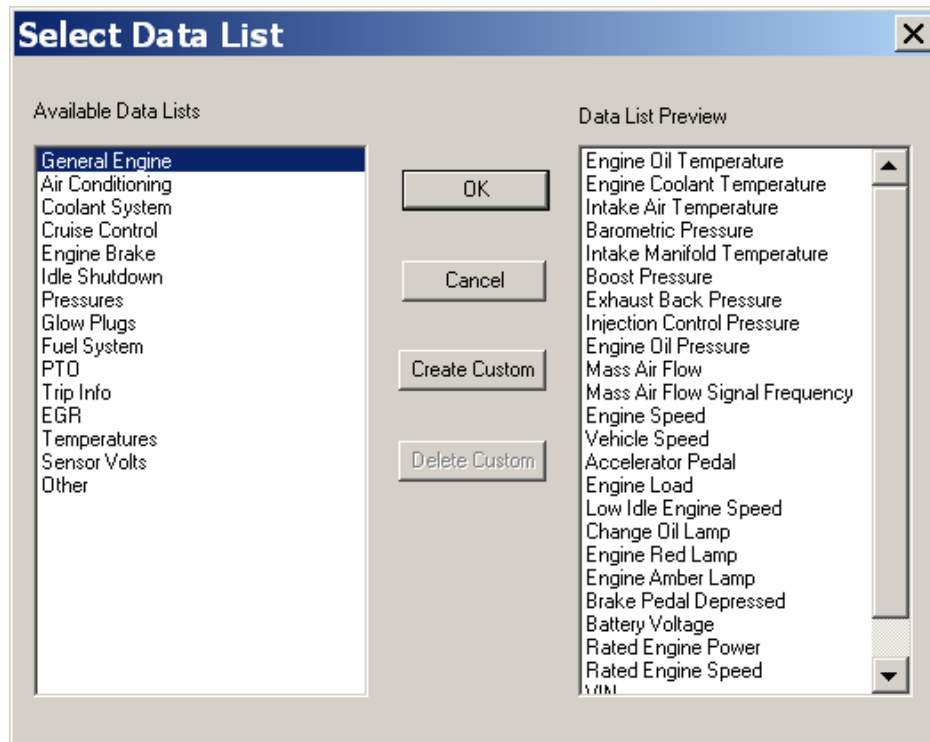


Figure 3.1

3.1 View Data Lists

- 1) From Available Data Lists, select the Data List you wish to view (e.g., **Coolant System**).

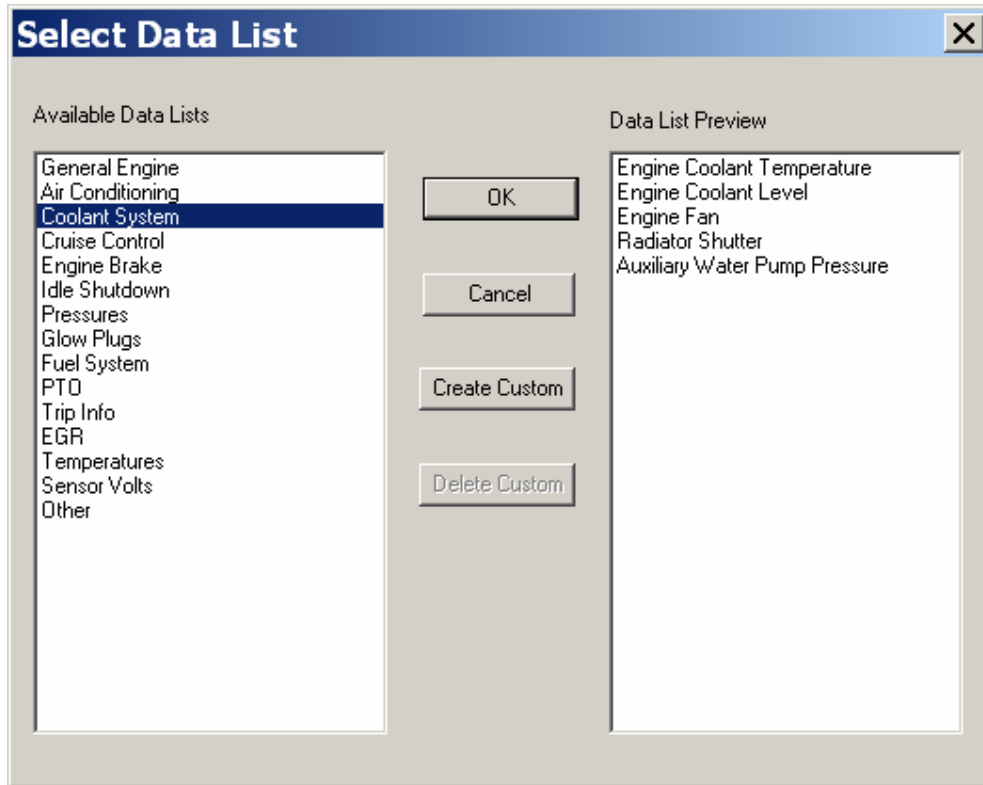


Figure 3.2

- 2) Click **OK** to view the variable engine parameters and current value status.

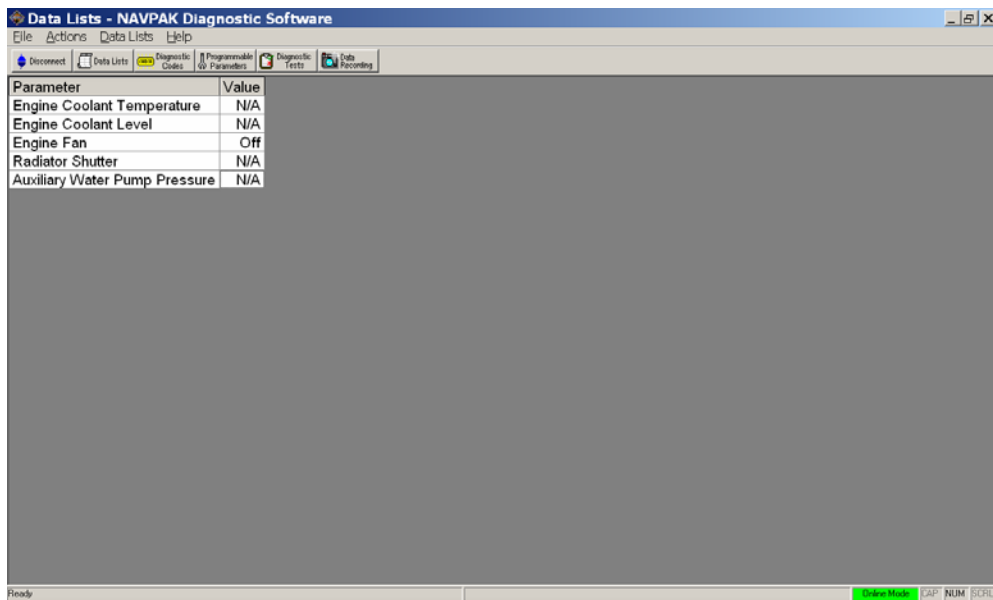


Figure 3.3

- 3) To select a different Data List, click **Select Data List** from the Data Lists menu.

3.2 Custom Data Lists

Custom Data Lists enable you to select a limited number of parameters to view for a specific test. Custom lists are saved when the software is shut down.

Custom Data Lists may be deleted, but not edited.

To create a Custom list:

- 1) Select  Data Lists from the toolbar.

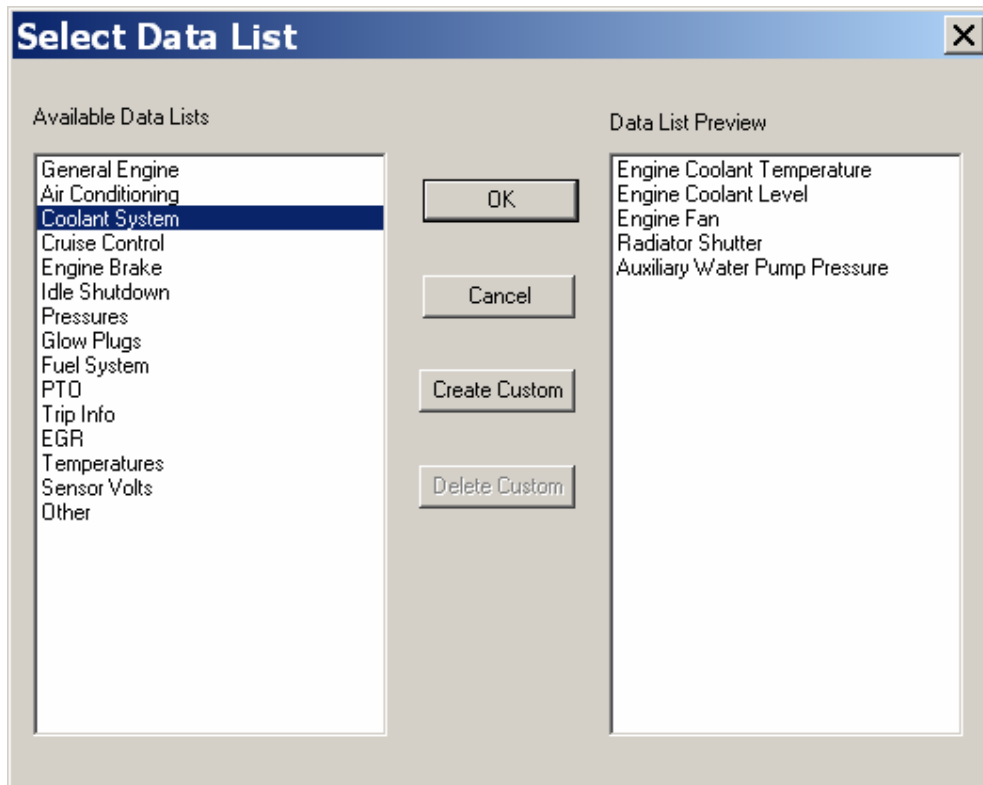


Figure 3.4

- 2) Select **Create Custom**.

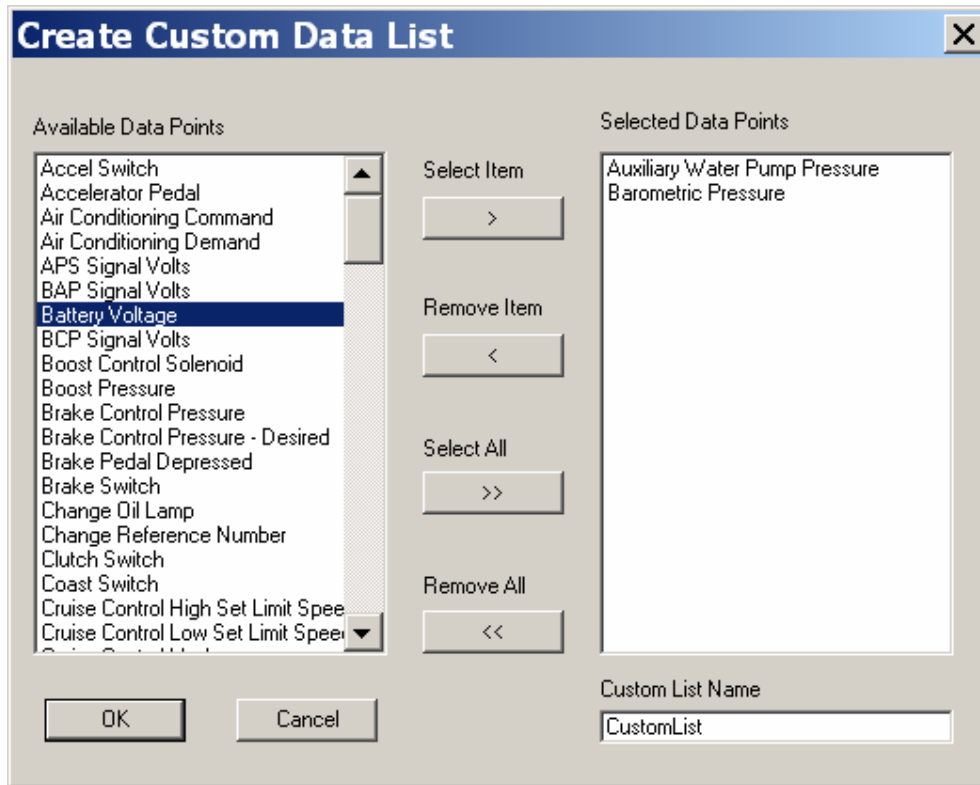


Figure 3.5

- 3) Double-click on the required parameters.
- 4) In the **Custom List Name** field, assign a name to the list (if you do not, a default name is automatically assigned).
- 5) Click **OK**.

The new custom list is displayed.

You will find your new custom list in the Data list menu any time you use this application.

3.3 Change Font Style and Size

- 1) Select the **Data Lists** menu.

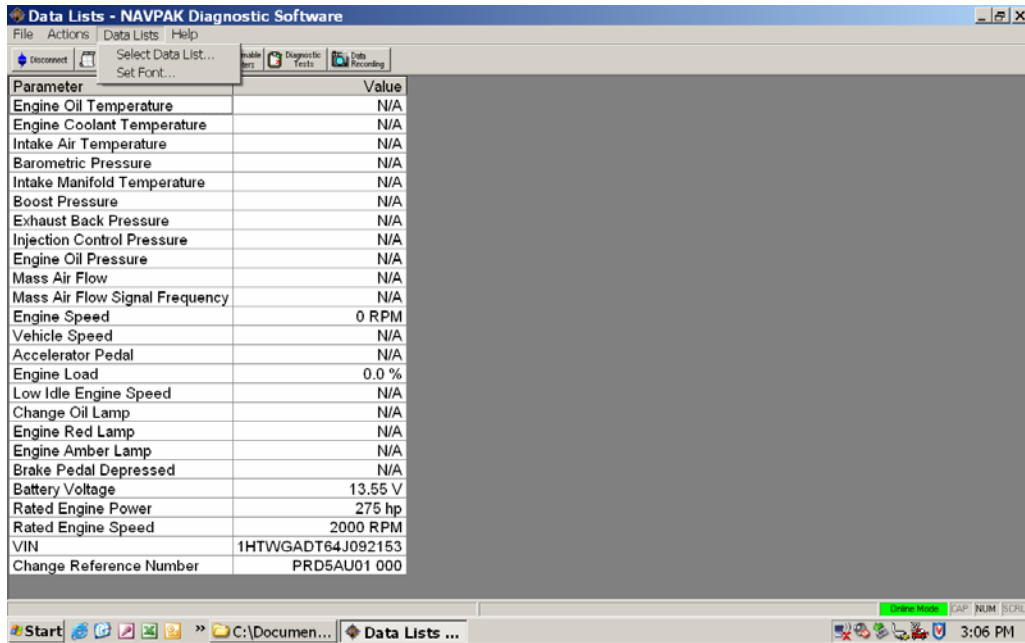


Figure 3.6

- 2) Select **Set Font**.

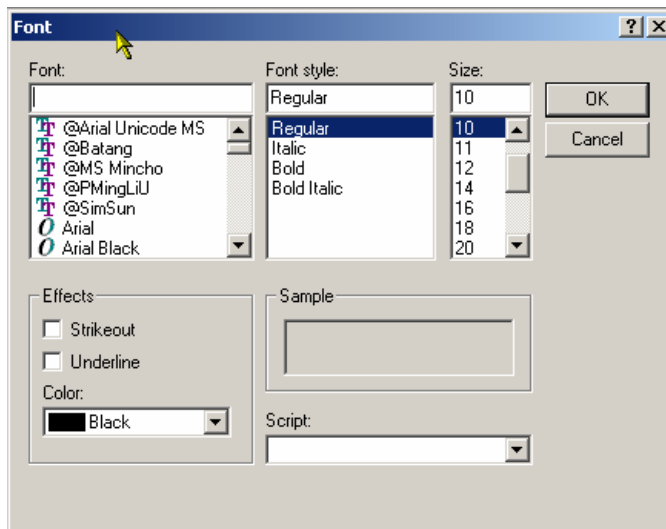


Figure 3.7

Note: It is especially useful to enlarge the font so that a data value may be read from a distance.

3.4 Print or Preview Data Lists

To print or preview data or custom lists at a single point in time:

- 1) Select the **File** menu.
- 2) Select **Print** (or Print Preview).

Note: Print Preview enables you to preview the printout on screen before printing.

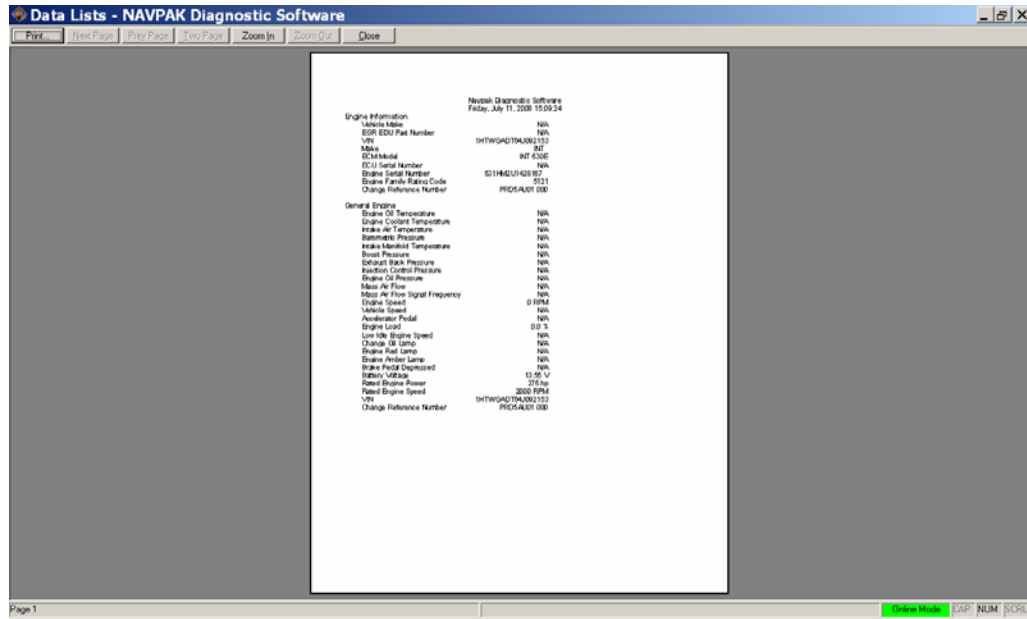


Figure 3.8

From the Print Preview screen, click **Print**, or **Close** to cancel.

- 3) Select **Print Set Up** to open the normal Windows® dialogue box, where you can select page orientation or modify the printer properties.

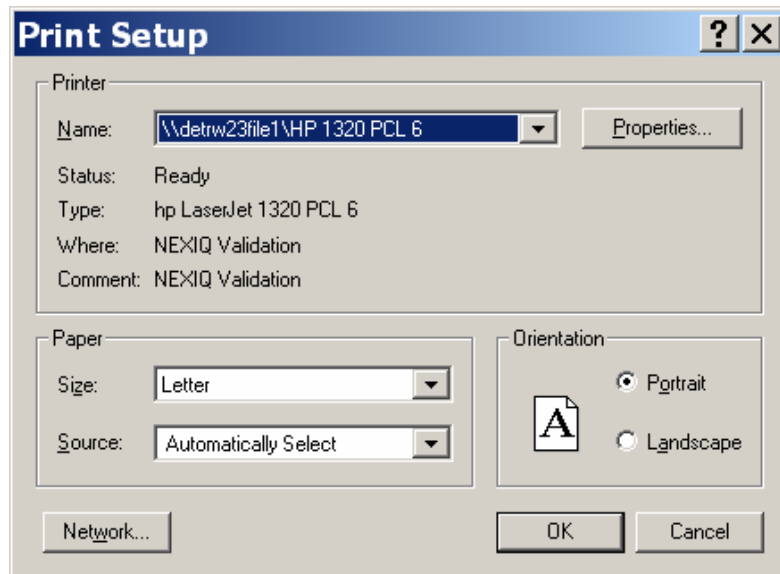


Figure 3.9

Note: If you are not connected to a printer, use the Save As option to create a .csv file.

3.5 Save Data List

The Data List may be saved to a .csv file for later analysis.

Note: The data saved will represent a single point in time only.

To save the Data List as a .csv file:

- 1) From the File menu, select **Save As** to bring up the standard Windows® file Save As dialogue box.
- 2) Accept the default directory and filename.

Note: You also have the option of changing the default if you choose.

Sample File Format

Parameter	Value
Engine Hours	55 Hr

4.0 Diagnostic Codes

This **Diagnostic Codes** option (available through the  icon on the toolbar) enables you to:

- View all trouble codes
- Clear inactive codes

4.1 Active Codes

Active Codes are trouble codes that are currently present on the engine. They will usually cause the engine warning light to illuminate.

Some trouble codes remain in the active list until the engine key is turned off even though the faults that created them are no longer present.

4.2 Inactive Codes

Inactive codes are logged trouble codes that have been active in the past. While the engine key is on, however, active codes transfer to the inactive list when the cause of the fault is removed.

Note: Intermittent faults may cause the same code to appear as both active and inactive.

To launch Diagnostic Codes:

- 1) Click on  on the toolbar.

The screen displays diagnostic codes with their descriptions.

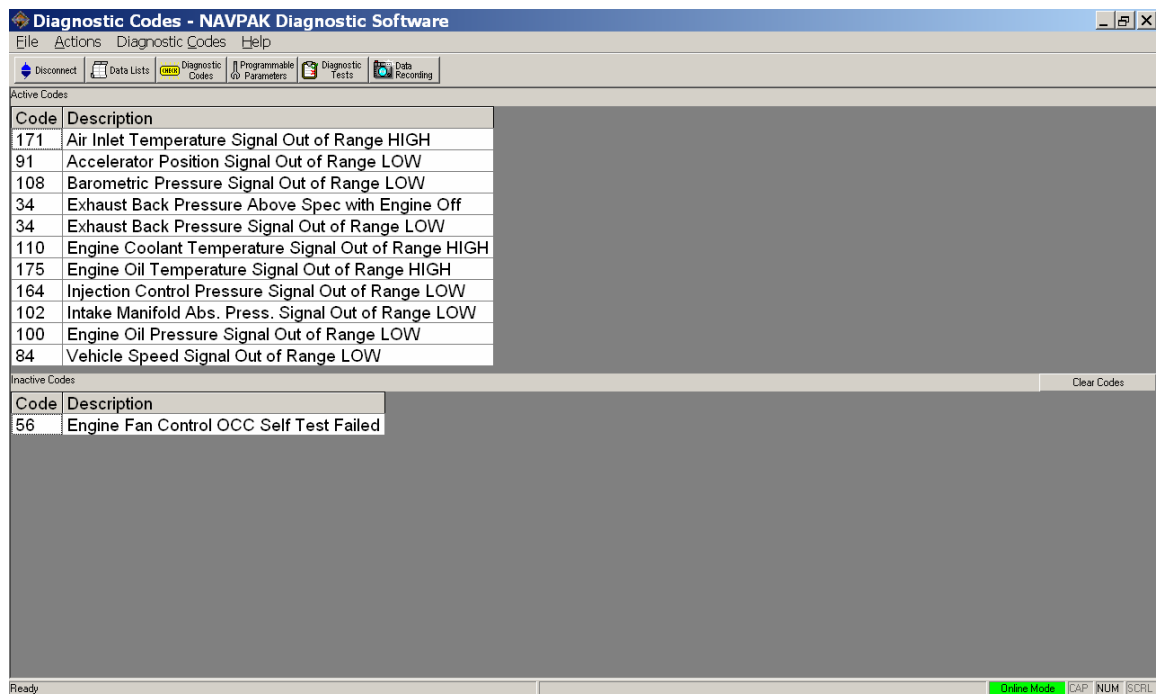


Figure 4.1

Note: This option enables you to view all trouble codes, and to clear the inactive codes.

If desired, you may view the more detailed J1587 data, which includes the following:

- PID (Parameter Identification Number)
- SID (System Identification Number)
- FMI (Failure Mode Indicator Number)

To access these codes:

- 1) Select **Diagnostic Codes** from the drop-down menu.
- 2) Select **J1587 Details**.
- 3) Click **ON**.

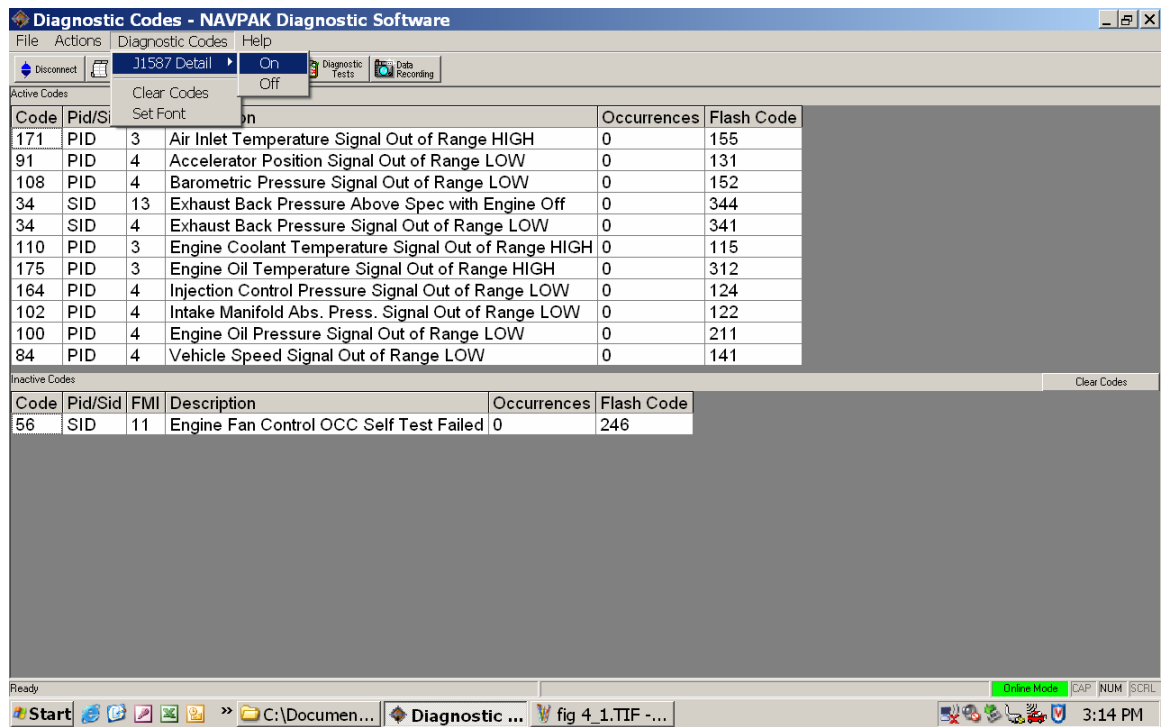


Figure 4.2

4.3 Save Diagnostic Codes

Diagnostic Codes may be saved to a .csv file for later analysis.

To save Diagnostic Codes to a .csv file:

- 1) Click on the **File** menu.
- 2) Select **Save As** to bring up the standard Windows® Save As dialogue.
- 3) Accept the default directory and filename.

Sample File Format

- **Active Trouble Codes**

Code	PID/SID	FMI	Description	Occurrences	Flash Code
171	PID	3	Air Inlet Temperature Signal Out of Range HIGH	0	155
91	PID	4	Accelerator Position Signal Out of Range LOW	0	155

- **Inactive Trouble Codes**

Code	PID/SID	FMI	Description	Occurrences	Flash Code
238	SID	11	Oil/Water Lamp OCC Self Test Failed	0	263
239	SID	11	Warn Engine Lamp OCC Self Test Failed	0	266

The PID, SID, and FMI data will not be saved if this option is not selected to view.

Note: It is not usually necessary to select J1587 Data.

4.4 Clear Codes

Diagnostic codes stored in the ECM's memory can be cleared. This is done to clear the inactive codes. You will need to do this in order to turn off the engine warning light when no active codes are present and to be able to detect when new codes occur again.

Remember to note or Save all codes that are present (both active and inactive) before you clear them.

To clear the codes:

- 1) Click **Clear Codes**, located on the right-hand side of the screen.
The software application prompts you that your request to clear codes has been sent.
- 2) Click **OK** to continue.



Figure 4.3

Note: If the fault is still present on the engine, this function will not clear the code.

5.0 Programmable Parameters

There are a number of parameters that control the way the engine operate (e.g., Road Speed Limiting). These parameters are different from the Data List parameters.

To customize the engine's operation, you may change the values for some parameters. Changes to these are password protected.

Note: Do not change any parameters unless you have been properly trained.

Warning! Changes to the values of Programmable Parameters could result in injury to the user or damage to the engine. Please contact your International[®] dealer for assistance.

Some parameters can be changed in one direction only. To change them back, you will have to reflash the ECM. Please contact your International[®] dealer for assistance with reprogramming

To launch Programmable Parameters:

- 1) Click  on the toolbar.

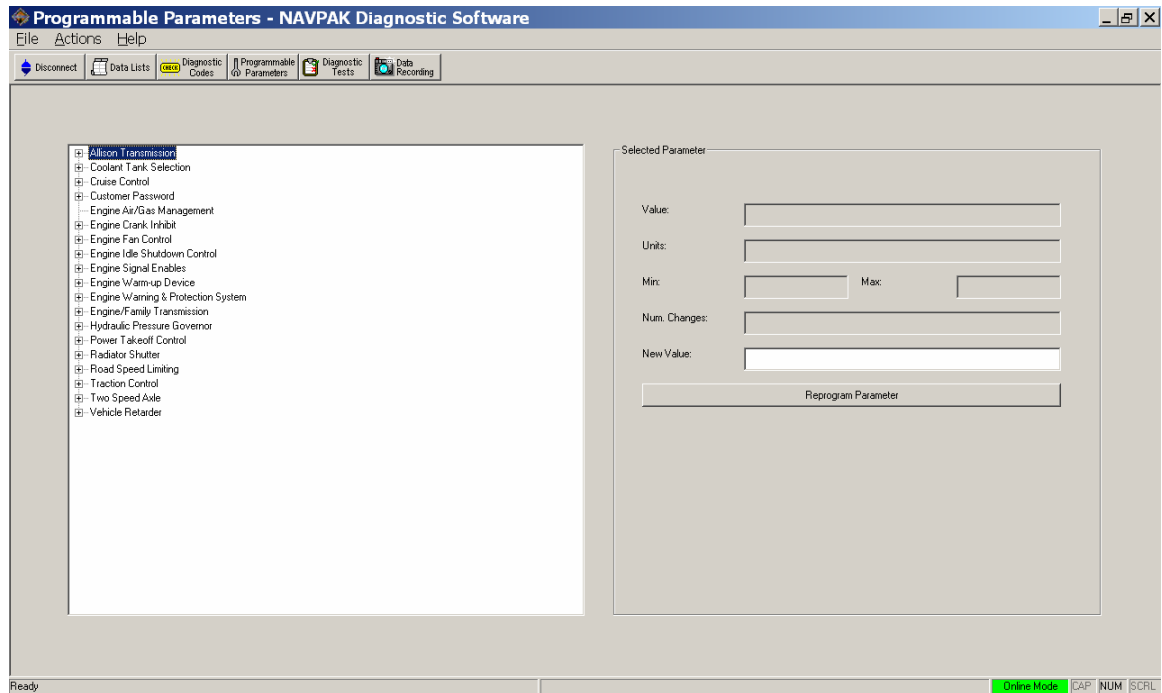


Figure 5.1

Programmable Parameters are grouped by category.

- 2) To view the parameters under a given category, click once on the **plus sign (+)** to the left of the category name.

The parameter names appear under the category name.

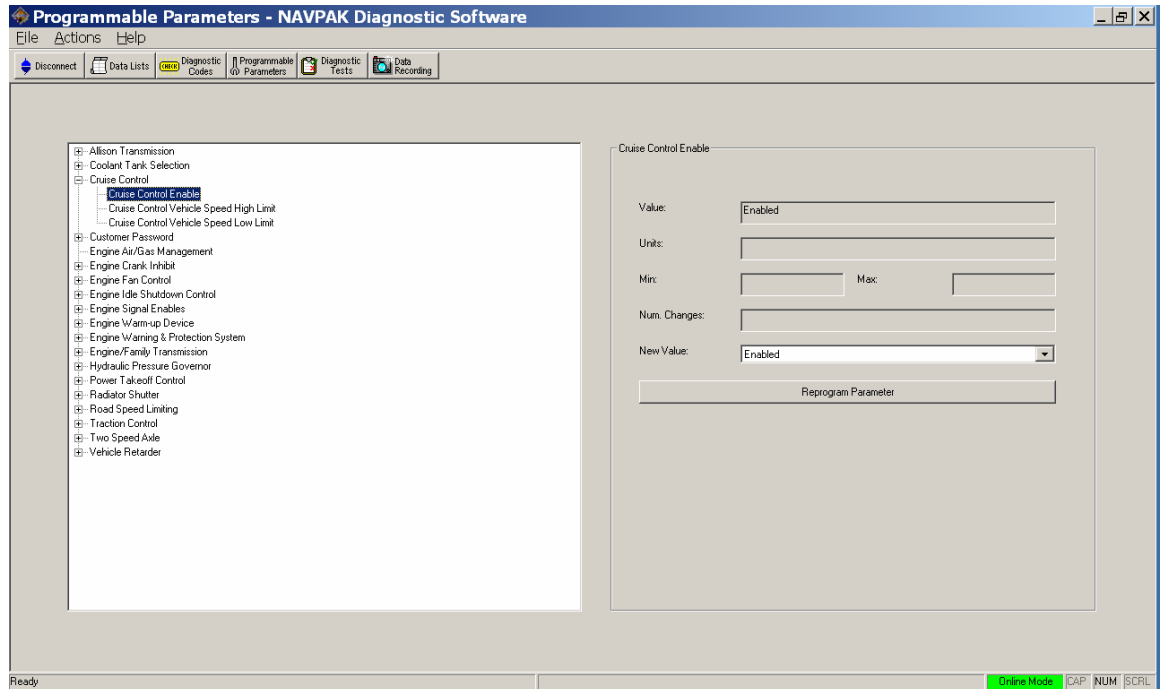


Figure 5.2

3) Click on the parameter name to view the following:

- The parameter's current value
- The upper and lower limits (where applicable)
- The number of times the parameter has been modified

Note: Use the plus (+) and minus (-) signs to expand and contract the items in the list.

5.1 Save As Programmable Parameters

Programmable Parameters may be saved to a .csv file for later analysis.

To save the Programmable Parameters to a .csv file:

- 1) Click on the **File** menu.
- 2) Select **Save As** to bring up the standard Windows® Save As dialogue.
- 3) Accept the default directory and filename.

Note: You also have the option of changing the default if you choose.

Sample File Format

Parameter Group	Parameter Name	Value	Units
EECM Manufacturing Data	ECM Serial Number	0274773	N/A
EECM Manufacturing Data	H/W Version	N/A	N/A
Programming Trace	Calibration Download Date	N/A	N/A

5.2 Reprogram Parameters

The **Programmable Parameters** screen displays the following fields on the right side of the screen:

- Value (i.e., current value)
- Units
- Min (i.e., the lower limit, where applicable)
- Max (i.e., the upper limit, where applicable)
- Num. Changes
- New Value

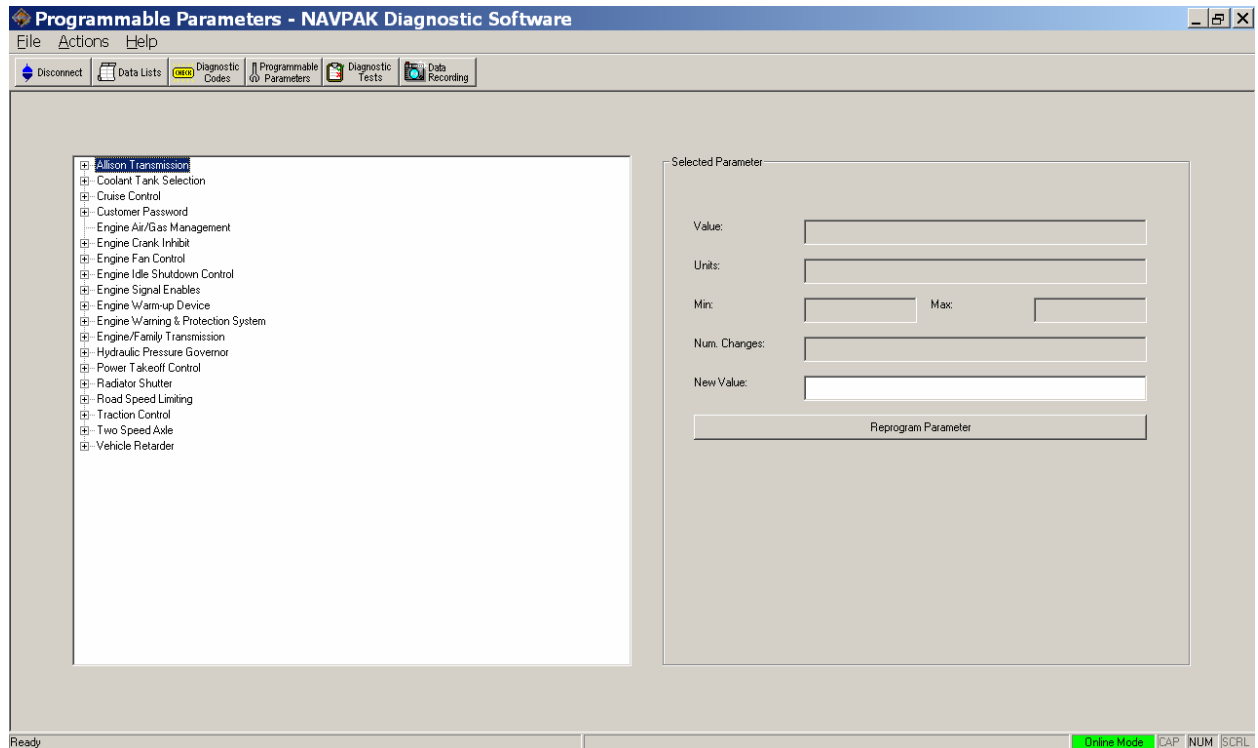


Figure 5.3

These values are stored in the ECM.

The **Reprogram Parameter** button is located below the Value fields.

How to Change a Value

To change a value:

- 1) Highlight the parameter you want to change in the list of parameters on the left side of the screen.
- 2) Enter the new values in the fields on the right side of the screen.
- 3) Click the **Reprogram Parameter** button.

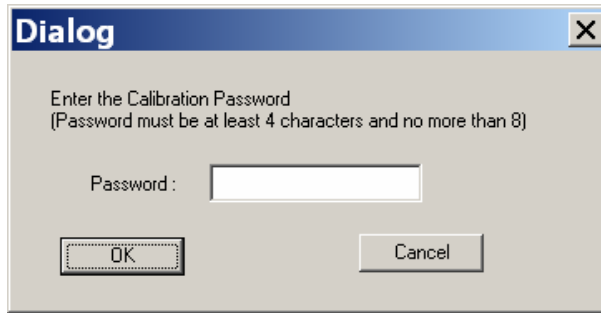


Figure 5.4

- 4) Enter the password (at least four characters, but no more than eight).

Generally, you will only have to enter the password once (i.e., the first time in a diagnostic session that you try to change a parameter value).

Note: If you have forgotten the password, you will have to reflash the ECM. Please contact your International[®] dealer for assistance with reprogramming.

- 5) Click **OK** to continue

How to Change the Password

You may change the password, if desired. The current password is required to change the password. Remember to record the new password and keep it in a secure location.

To change the password:


- 1) Click  on the toolbar.
- 2) Click on the plus (+) sign next to the **Customer Password** feature.
- 3) Click **Customer Password**.



Figure 5.5

- 4) Enter the new password (at least four characters, but no more than eight).
- 5) Confirm the new password.
- 6) Click **OK**.

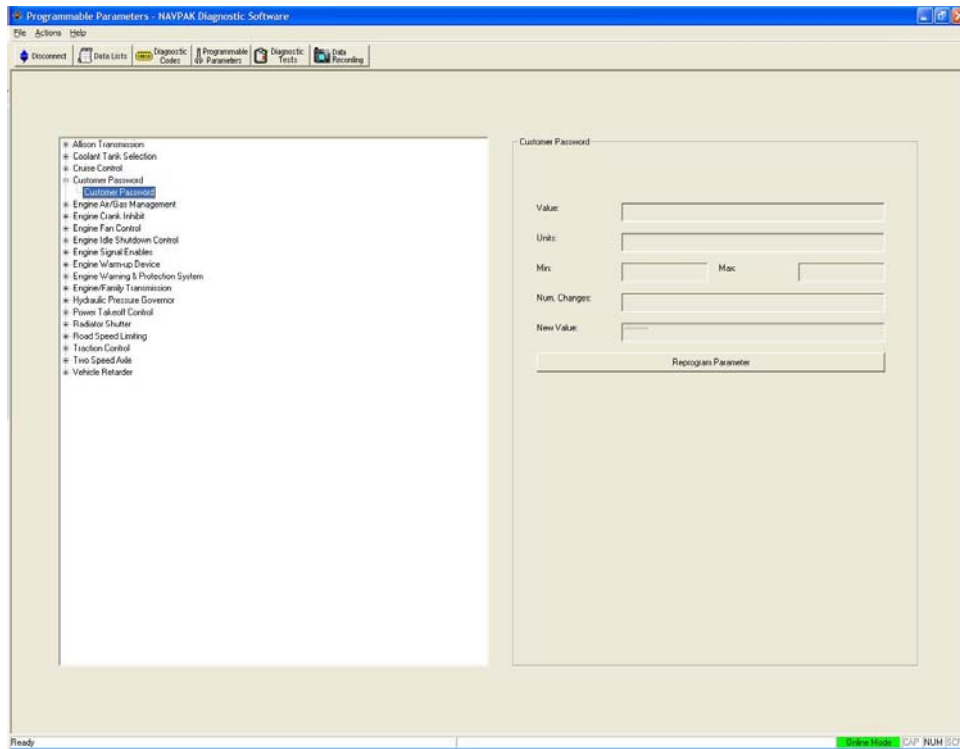


Figure 5.6

The New Value field is populated with asterisks, masking the new password.

Note: The field is disabled (grayed out), forcing you to use the Customer Password dialog (Fig. 5.5) to enter the new password.

- 7) Click on the **Reprogram Parameter** button.

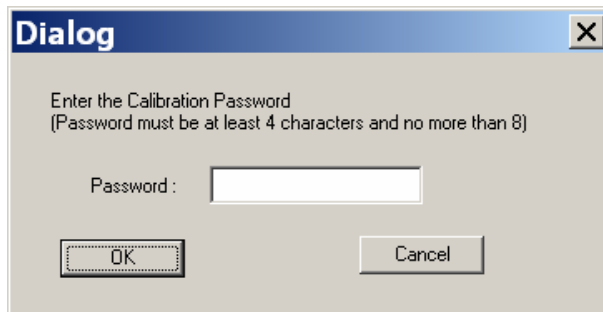


Figure 5.7

- 8) Type the Calibration Password (i.e., **the old password**) in the Password field.
- 9) Click **OK** to initiate the change and set the new password.

Note: If you click Cancel, the dialog will close. If you wish to change the password after this sequence of events, you must first click on a different parameter and then go back to the Customer Password parameter to access the Customer Password dialog (Fig. 5.5).

6.0 Diagnostic Tests

Diagnostic tests are used to test the continuity of electrical circuits and certain functions in the ECM. They give more information about faults than can be obtained from the data lists and diagnostic codes alone. The following tests are available:


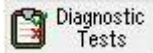
- KOEO (Key On Engine Off) Tests
- Relative Compression Test (Cranking Only)—DLC II only
- Injector Disable Tests—DLC II only
- KOER (Key On Engine Running) Tests

Notes:

- You must run the Key On Engine Off Standard test prior to running any other KOEO test.
- You must run the Key On Engine Running Standard test prior running to any other KOER test.
- Depending on the type of engine to which the application is connected (e.g., DLC I, II, or III), some tests may not be available.

If you fail to run the Standard test, you will be prevented from running other tests and prompted to run the Standard test first. To start the selected Diagnostic test, click the **Start** button. The test will begin. View the **Test Status** box for results.

To launch Diagnostic Tests:

- 1) Click  on the toolbar.
- 2) Note, or save, any active and inactive codes.
- 3) Clear the codes. (*4.4 Clear Codes*).
- 4) Click  on the toolbar.

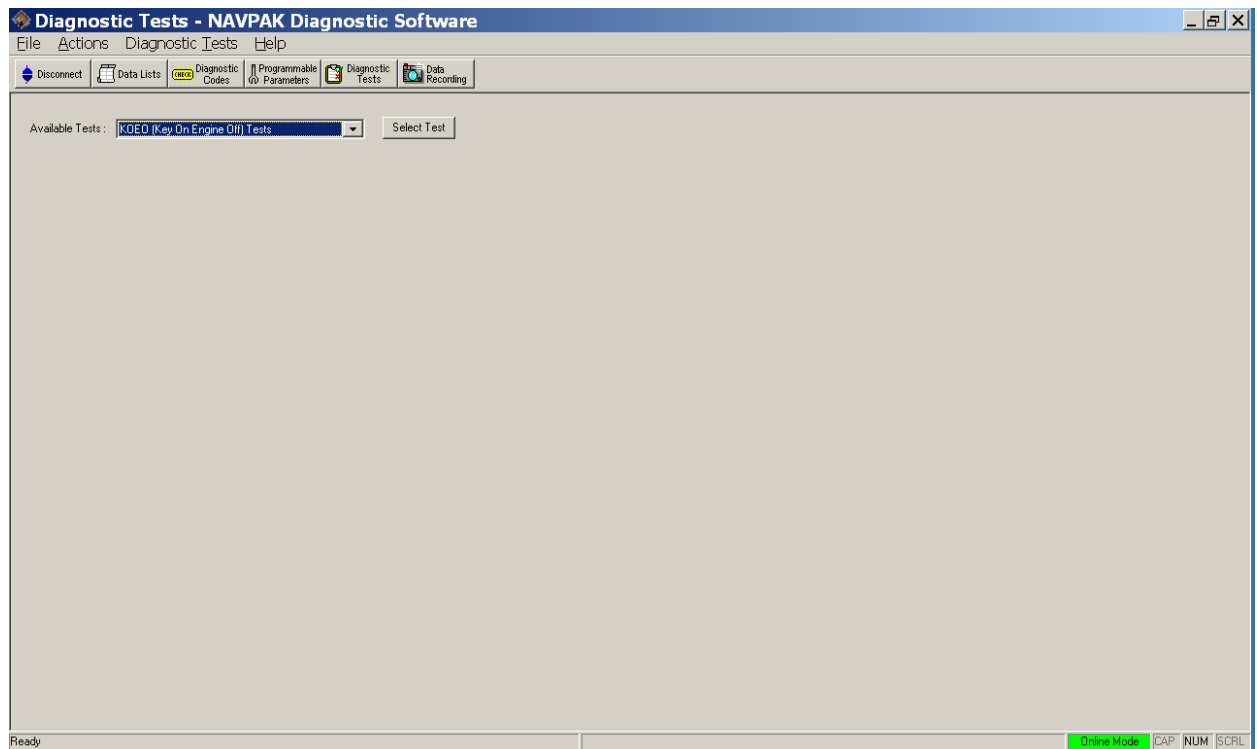


Figure 6.1

- 5) Under Available Tests, click on the Down Arrow to select from the following options:
 - KOEO Key On Engine Off Tests
 - Relative Compression Test (Cranking Only)
 - Injector Disable Tests
 - KOER Key On Engine Running Tests
- 6) Click on the **Select Test** button.

To start a test:

- 1) Click the radio button next to the test you wish to run.

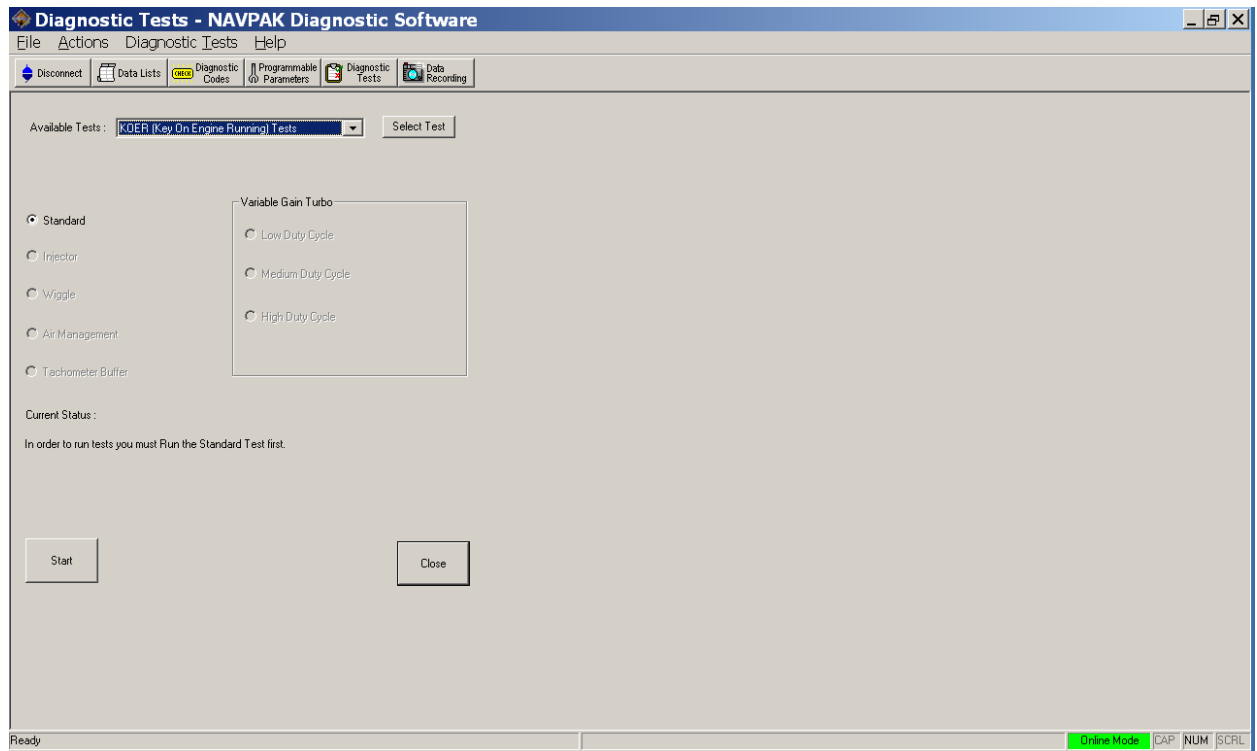


Figure 6.2

- 2) Click **Start**.
The test will begin.
- 3) View the test results in the Current Status area .
- 4) Do one of the following:
 - Click **Continue** if you wish to make additional selections and run other tests.
 - Click **Close** to return to the Available Tests screen.

6.1 (KOEO) Key On Engine Off Tests

When you select **KOEO (Key On Engine Off) Tests**, you are presented with the following choices:

- Standard
- Injector
- Wiggle
- Vehicle Speed Sensor
- Output State
 - Low/Off
 - High/On
 - Glow Plug/Inlet Air Heater

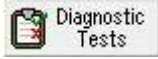
Note: Depending on the type of engine to which the application is connected (e.g., DLC I, II, or III), some tests may not be available.

Standard Test (Key On Engine Off)

The **Standard** test checks for electrical continuity when actuators and relays are activated. Test results are displayed in the Current Status area at the bottom of the screen. Diagnostic codes may appear.

Note: You must run the Key On Engine Off Standard Test prior to running any of the other KOEO tests.

To run the Standard test:

- 1) Click  on the toolbar.
- 2) Select **KOEO (Key On Engine Off) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.

When the test concludes, the application is updated.

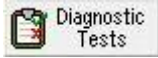
- 6) Click **Close** to end the test.

Injector Test (Key On Engine Off)

The **Injector** test audibly operates the injector solenoids in sequence. Listen for each in turn to check if they are working. Test results are displayed in the Current Status area at the bottom of the screen. Diagnostic codes may appear.

Note: You must run the Key On Engine Off Standard Test prior to running any of the other KOEO tests.

To run the Injector test:

- 1) Click  on the toolbar.

- 2) Select **KOEO (Key On Engine Off) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Injector**.
- 8) Click **Start**.

When the test concludes, the application is updated.

- 9) Click **Close** to end the test.

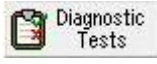
Wiggle Test (Key On Engine Off)

The **Wiggle** test checks for intermittent conditions that cause faults to be detected in the wiring or connections. While the test is running move (i.e., wiggle) any connections you find on the engine to allow the program to detect any intermittent ones.

Test results are displayed in the **Current Status** area of the screen. Diagnostic codes may appear, but then disappear as the connection is remade. They will be visible in the Inactive Codes list.

Note: You must run the Key On Engine Off Standard Test prior to running any of the other KOEO tests.

To run the Wiggle test:

- 1) Click  on the toolbar.
- 2) Select **KOEO (Key On Engine Off) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Wiggle**.
- 8) Click **Start**.

The test runs until you decide to end it.

- 9) Click **Close** to end the test.

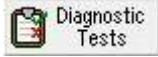
Vehicle Speed Sensor Test (Key On Engine Off)

The **Vehicle Speed Sensor** test energizes the vehicle speedometer circuit to enable you to verify that the speedometer is displaying a response from the vehicle ECU. The test cycles the speedometer output circuit through various ranges to enable you to test the input/output of the circuit.

Test results are displayed in the **Current Status** area of the screen. Diagnostic codes may appear.

Note: You must run the Key On Engine Off Standard Test prior to running any of the other KOEO tests.

To run the Injector test:

- 1) Click  on the toolbar.
- 2) Select **KOEO (Key On Engine Off) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Vehicle Speed Sensor**.
- 8) Click **Start**.

When the test concludes, the application is updated.

- 9) Click **Close** to end the test.

Output State Tests (Key On Engine Off)

The purpose of these tests is to diagnose the operation of the output signals and actuators.

Note: During these tests, the output of the circuit in question can be monitored with a digital voltmeter (DVM). The DVM will measure a High or Low voltage state condition as the outputs are toggled. The actual voltage will vary with the circuit tested.

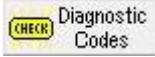
To run these tests, select one of the following modes from the KOEO (Key On Engine Off) Tests menu:

- Low/Off
- High/On
- Glow Plug/Inlet Air Heater

When in **Outputs Are Low** mode the ECM pulls down the output voltage to their low state. This actuates the output components that are controlled by the ECM, grounding the circuits. During this test Outputs Are Low is displayed on the screen.

When in **Outputs Are High** mode the ECM will pull up the output voltage to their high state. This actuates the output components that are controlled by the ECM, energizing the control circuits. During this test Outputs Are High is displayed on the screen.

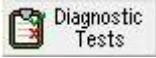
When in **Glow Plug/Inlet Air Heater** mode, the ECM pulls the output voltage to its highest state. This energizes the Glow Plug/ Inlet Air Heater, turning the equipped device on. The ECM then pulls down the output or grounds the devices, turning them off.

Important! If problems are found during a test, faults are generated for those problems. Click  on the toolbar to check if any new faults were generated as the result of the test.

Test results are displayed in the **Current Status** area of the screen. Diagnostic codes may appear, but then disappear as the connection is remade. They will be visible in the Inactive Codes list.

Note: You must run the Key On Engine Off Standard Test prior to running any of the other KOEO tests.

To run the Output State tests:

- 1) Click  on the toolbar.
- 2) Select **KOEO (Key On Engine Off) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select test you wish to run (e.g., **Glow Plug/Inlet Air Heater**) from the Output State area of the screen.
- 8) Click **Start**.

The test runs until you decide to end it.

- 9) Click **Close** to end the test.

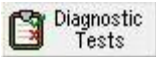
6.2 Relative Compression Test (Cranking Only)

The **Relative Compression Test** measures engine RPM during each compression stroke while cranking the engine. It then compares the RPM of all of the cylinders to determine if there is a cylinder that is weaker than the rest.

Note: This test is only available when connected to a DLC II ECM.

Once a cylinder is determined to be weak, a manual compression test should be run on that cylinder and on a good cylinder to verify results.

To run the Relative Compression Test:

- 1) Click  on the toolbar.
- 2) Select **Relative Compression Test (Cranking Only)** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Cycle key ignition, and click **Start** to begin the test.
- 5) Follow the instructions outlined at the bottom of the window during the test.

You will be instructed when to start cranking the engine and how long to continue to cranking the engine. When instructed to stop cranking the engine, you must do so, immediately. At this juncture the ECM will perform a calculation based on the data collected during the engine crank. The application will request this information when the ECM is ready.

When the relative compression information is received, the application will display the results in the window.

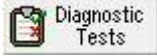
- 6) Click **Start** to re-run the test.
- 7) Cycle key ignition before leaving test screen

6.3 Injector Disable Tests

The Injector Disable tests enable you to check the contribution from each cylinder, bank by bank. You continue testing cylinders (i.e., banks) until no change in engine RPM is observed. The injector that has been cut out but does not produce a change in RPM is not contributing to engine performance.

Note: These tests are only available when connected to a DLC II ECM.

To perform the Injector Disable Tests:

- 1) Click  on the toolbar.
- 2) Select **Injector Disable Tests** from the Available Tests drop-down menu.
- 3) Click **Select Test**.
- 4) Select an Engine Injector to test (e.g., 1 through 6), or choose to disable a bank of injectors (e.g., Disable Bank 1).
- 5) Click **Start**.

At this point you have multiple options. You can choose to test a different bank (e.g., select Disable Bank 2, and click Start again), or you can choose to add an additional injector to the bank currently being tested. In each case, you must click Start after each selection.


- 6) Continue making selections and testing various combinations until no change in engine RPM is observed.
The injector that has been cut out but that does not produce a change in RPM is not contributing to engine performance.
- 7) Do one of the following:
 - Click **Continue** if you wish to make additional selections and run other tests.
 - Click **Close** to return to the Available Tests screen.

6.4 (KOER) Key On Engine Running Tests

When you select **KOER (Key On Engine Running) Tests**, you are presented with the following choices:

- Standard
- Injector
- Wiggle
- Air Management
- Tachometer Buffer
- Variable Gain Turbo
 - Low Duty Cycle
 - Medium Duty Cycle
 - High Duty Cycle

Notes:

- Depending on the type of engine to which the application is connected (e.g., DLC I, II, or III), some tests may not be available.
- If problems are found during a test, faults are generated for those problems. Click  on the toolbar to check if any new faults were generated as a result of the test.

Standard Test (Key On Engine Running)

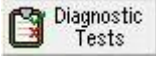
The **Standard** test checks the health of the high-pressure oil system by requesting step changes in Actuation pressure, and monitoring the speed of change and the actual pressures achieved.

Test results are displayed in the **Current Status** area of the screen. Diagnostic codes may appear.

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Standard test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.

When the test concludes, the application is updated.

- 6) Click **Close** to end the test.

Injector Test (Key On Engine Running)

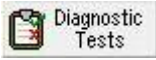
The **Injector** test checks the contribution from each cylinder. It decreases fuel on one cylinder and increases the fuel on the other cylinders to maintain engine speed constant. It then repeats for each cylinder in turn.

Test results are displayed in the **Current Status** area of the screen. Diagnostic codes may appear.

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Injector test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Injector**.
- 8) Click **Start**.

When the test concludes, the application is updated.

- 9) Click **Close** to end the test.

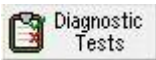
Wiggle Test (Key On Engine Running)

The operation of this test is the same as the **Wiggle Test (Key On Engine Off)**. The added conditions of vibration and high temperature on the operating engine may cause additional diagnostic codes to be discovered.

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Wiggle test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.

- 6) When the test has completed, click **Continue**.
- 7) Select **Wiggle**.
- 8) Click **Start**.

The test runs until you decide to end it.

- 9) Click **Close** to end the test.

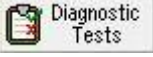
Air Management Test (Key On Engine Running)

The **Air Management** test checks the operation of the VGT and EGR by actuating each component open and closed, while monitoring the effect it has on exhaust back pressure using the EBP sensor.

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Air Management test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Air Management**.
- 8) Click **Start**.

When the test concludes, the application is updated.

- 9) Click **Close** to end the test.

Tachometer Buffer Test (Key On Engine Running)


The ECM provides an output for a remote tachometer with a 0 V to B+ digital signal that indicates engine speed. The frequency is one fifth (1/5) of the actual engine RPM (twelve pulses per engine revolution). The ECM receives a signal from the CMP sensor and calculates engine speed (RPM). The ECM sends the calculated engine speed as a digital buffered TACH signal from the ECM connector to the owner installed tachometer.

The **Tachometer Buffer** test enables you to test the signal feed to the Tachometer to ensure proper communications for supported systems.

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Tachometer Buffer test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) Select **Tachometer Buffer**.
- 8) Click **Start**.

When the test concludes, the application is updated.

- 9) Click **Close** to end the test.

Variable Gain Turbo Tests (Key On Engine Running)

The **Variable Gain Turbo** tests enable you to test the Variable Gain Turbocharger (VGT). The Variable Geometry Turbocharger (VGT):

- Provides faster turbo response and quicker acceleration with less lag
- Controls the pressure difference between exhaust and inlet manifolds to ensure proper EGR operation
- Increases the exhaust back pressure to increase engine braking

Note: You must run the KOER Standard Test prior to running the Variable Gain Turbo test.

There are three variations to the test.


- Low Duty Cycle
- Medium Duty Cycle
- High Duty Cycle

Variable Gain Turbo Low Duty

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Variable Gain Turbo Low Duty test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) From the Variable Gain Turbo box on the right, select **Low Duty Cycle**.
- 8) Click **Start**.

The test runs until you decide to end it.

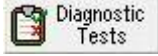
- 9) Click **Close** to end the test.

Variable Gain Turbo Medium Duty

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Variable Gain Turbo Medium Duty test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) From the Variable Gain Turbo box on the right, select **Medium Duty Cycle**.
- 8) Click **Start**.

The test runs until you decide to end it.

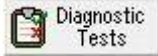
- 9) Click **Close** to end the test.

Variable Gain Turbo High Duty

The engine must be running and the Engine Coolant Temperature must be over 180°F to begin the test.

Note: You must run the Key On Engine Running Standard Test prior to running any of the other KOER tests.

To run the Variable Gain Turbo High Duty test:

- 1) Click  on the toolbar.
- 2) Select **KOER (Key On Engine Running) Tests** from the Available Tests list.
- 3) Click **Select Test**.
- 4) Select **Standard** to first run the standard test.
- 5) Click **Start**.
- 6) When the test has completed, click **Continue**.
- 7) From the Variable Gain Turbo box on the right, select **High Duty Cycle**.
- 8) Click **Start**.

The test runs until you decide to end it.


- 9) Click **Close** to end the test.

7.0 Data Recording

Data Recording enables you to capture data from the Engine Data List over a specified time period, and save the recorded data to a file. The recording file can then be played back normally, or reviewed frame by frame.

A trigger event is associated with each recording. The Software is continuously recording all the data transmitted by the ECM throughout a diagnostic session you can specify the position of the trigger within the recorded time period, enabling you to view data both before and after the trigger point.

You can manually trigger the recording while viewing the Engine Data List “live” on the screen, or you can choose to trigger on the occurrence of a diagnostic code.

Click  on the toolbar to open this feature.

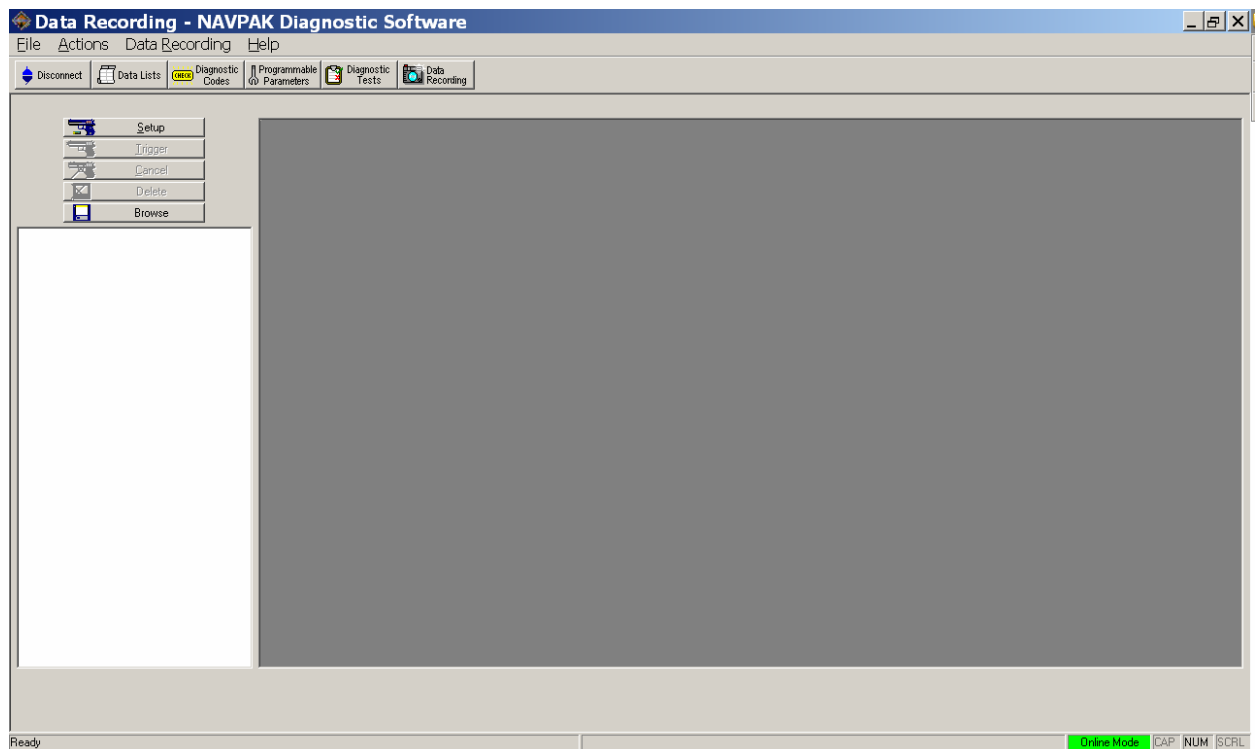


Figure 7.1

7.1 Setup Recording

The Data Recording Setup dialog enables you to specify the following:

- Recording Length
- Display Interval
- Trigger On

Note: There are three modes:

- Manual
- Any Fault Code
- Specific Fault Code

Note: If you choose to trigger the recording on a Specific Fault Code, you can select the


appropriate code from a drop-down list at the bottom of the dialog. To do so, you must first select **Specific Fault Code** from the Trigger On menu. Then select the appropriate code from the Specific Fault Code Selection menu.

- Trigger Position in Recording
- Specific Fault Code Selection

Notes:

- If you selected Any Fault Code or Specific Fault Code as the Trigger On mode, wait for the fault condition to occur.
- The data recording will proceed automatically.
- If the fault condition does not occur as expected, click Trigger to proceed with data recording anyway, or click Cancel to abort and discard the recording.

How to Set Up a Data Recording

- 1) Click  on the toolbar.
- 2) Click the **Setup** button in the upper left corner of the screen.

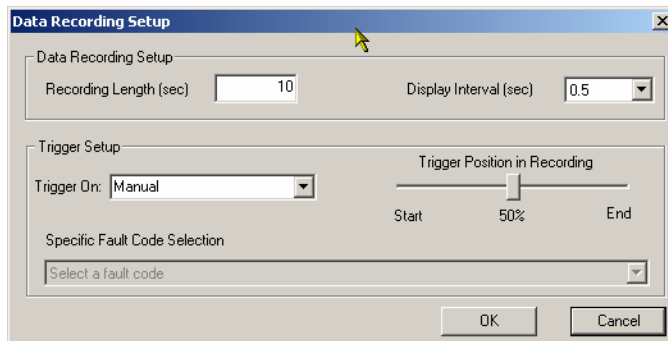


Figure 7.2

- 3) Specify the **Recording Length** (in seconds).
- 4) Select the **Display Interval**.
- 5) Select the appropriate mode from the **Trigger On** menu.

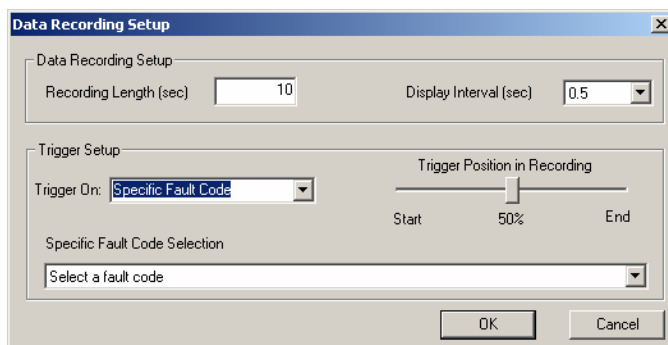


Figure 7.3

- 6) Use the sliding bar to set the **Trigger Position**.
The percentage of recording time before the trigger is displayed below the sliding bar.
- 7) (Optional) Select the appropriate fault code if in Step 5 you specified Specific Fault Code.

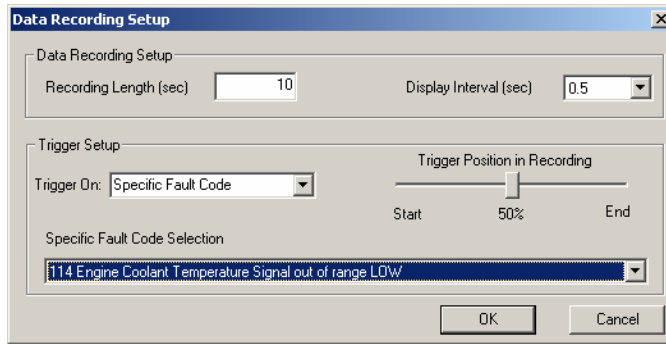


Figure 7.4

Note: If you decide to trigger the recording on a Specific Fault Code, you can select the appropriate code from a drop-down list at the bottom of the screen. To do so, you must first select **Specific Fault Code** from the Trigger On menu. Then select the appropriate code from the Specific Fault Code Selection menu.

- 8) Click **OK** to begin monitoring Live data and waiting for the trigger event.

7.2 Recording Mode

Live Data is displayed on the status bar at the bottom of the screen. The file list and all buttons except Trigger and Cancel are disabled. While waiting for the trigger, a flashing indicator and an appropriate Waiting-for-Trigger message are displayed above the Data List.

If you selected Manual Trigger mode in the Data Recording Setup dialog, click the Trigger button on the left of the screen to trigger the Data Recording.

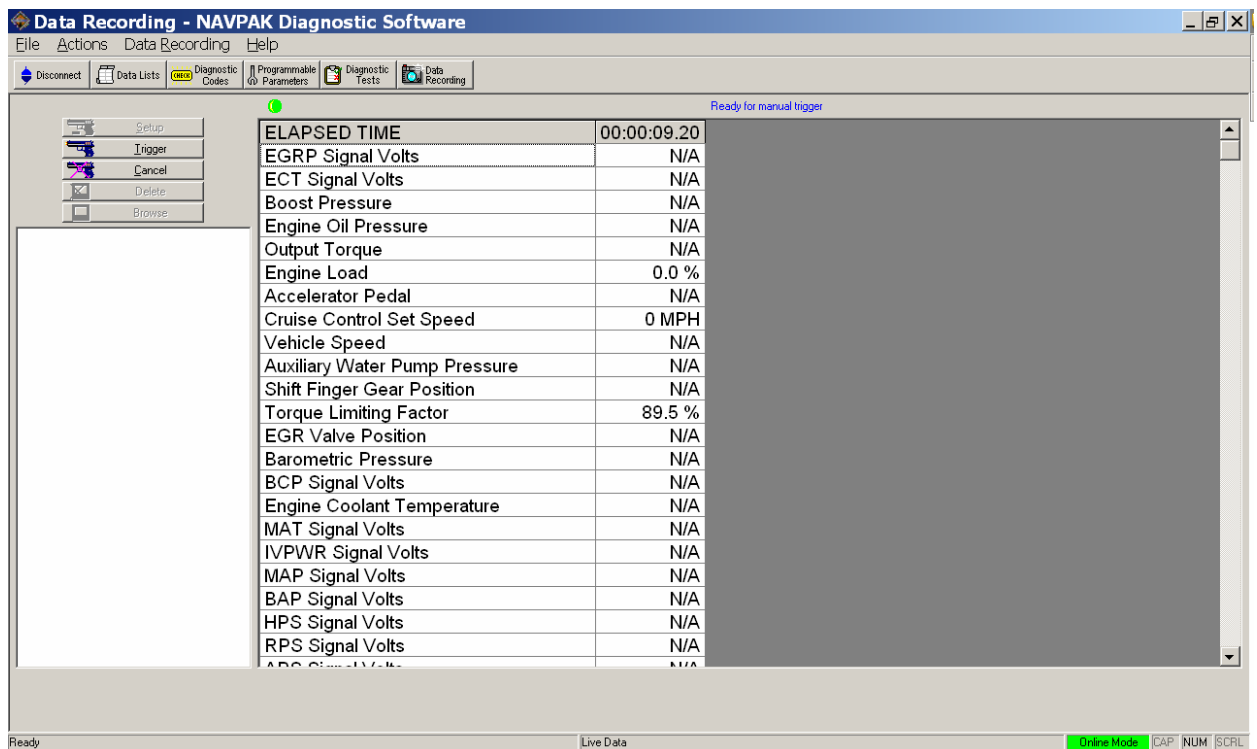


Figure 7.5

Once the trigger event occurs, a progress indicator appears below the data list, moving left to right as the recording is completed. At the end of the specified recording period, the data is saved to a file, whose name is assigned automatically to indicate the date and time of the trigger event. The filename is added to the Data Recording File list,

and the file is opened in Playback Mode. There will be a delay while the recorded data is being saved to file.

The file is assigned a name in the format: RMMDD_hhmmss.fdp where “R” signifies a Data Recording and the numbers are the date and time of the trigger point.

Notes:

- If you click Cancel before the trigger, the recording is aborted. You can then select an existing file for Playback, or Click Setup to start a new recording.
- If you click Cancel after the trigger, you will be given a choice to save the data collected so far, or to abandon it.







7.3 Playback Mode

To playback a previous Data Recording, select the desired recording from the file list on the Data Recording Screen.

The data list at the trigger point is displayed. The playback controls appear at the bottom of the screen, and a timestamp appears at the top of the data list. This is the time in hours, minute's seconds and hundredths of a second relative to the trigger point. (Negative value before the trigger, and positive value after it.)

In Playback Mode, the recording file name appears on the status bar. The Trigger and Cancel buttons are disabled. The position of the slider denotes the relative position of the currently displayed frame within the recording.

The control buttons are used to:

- Click [] to jump to the first frame of the recording.
- Click [] to jump to the last frame of the recording.
- Click [] to go forward one frame.
- Click [] to go back one frame.
- Click [] to play the recording at normal speed.
- Click [] to stop the playback.

While playing, the Play button changes to Stop. The T above the slider bar shows the position of the trigger within the recording.

7.4 Changing File Directories (Browse)

When the NAVPAK Diagnostic Software is started, the Recording File directory is initialized to its default location. Only files stored in the current directory are displayed on the list.

The default directory is:

```
C:\Program Files\NEXIQ\NAVPAK\xVDS\Recordings
```

To change the default:

- 1) Click **Browse** to open a Select Directory dialog.
- 2) Click on the desired directory (folder).
- 3) Click **OK** to change to the new directory and display any Recording Files

7.5 Deleting a Recording File

To delete a Recording File, while in Playback mode:

- 1) Click on the name of the file you wish to delete from the Data Recording Files List.
- 2) Click the **Delete** button.
A confirmation dialog will appear.
- 3) Click **YES** to confirm deletion, or **NO** to cancel.

8.0 Loss of ECM Communication

Occasionally communication with the ECM can be lost. A probable cause for this condition is that the ECM has been keyed off, or if the connection to the ECM has been broken.

To re-establish communication with the ECM:


- 1) Check the connections to ensure that all connections are secure.



Figure 8.1

- 2) Click **OK**.
 - If the J1708 light on the Data Module is illuminated or flashing, the loss of communication was only temporary. Click **OK** to clear the dialogue box and to allow continued operation of the software.
 - If the Data Module lights are not flashing, and the dialogue box returns almost immediately:
 - 1) Check that the ECM still has power and that the key is on.
 - 2) Check the connections between the ECM and the computer.
 - 3) Check the cables for wear and damage.

Note: Damaged cables or connectors must be replaced.

- 4) Click  **Connect** to restore communication with the ECM.

9.0 Exit Diagnostic Software

It is better to close down the software (i.e., Exit) before you Key the engine off and disconnect from the engine.

To exit the NAVPAK Diagnostic Software:

- 1) Select the **File** menu.

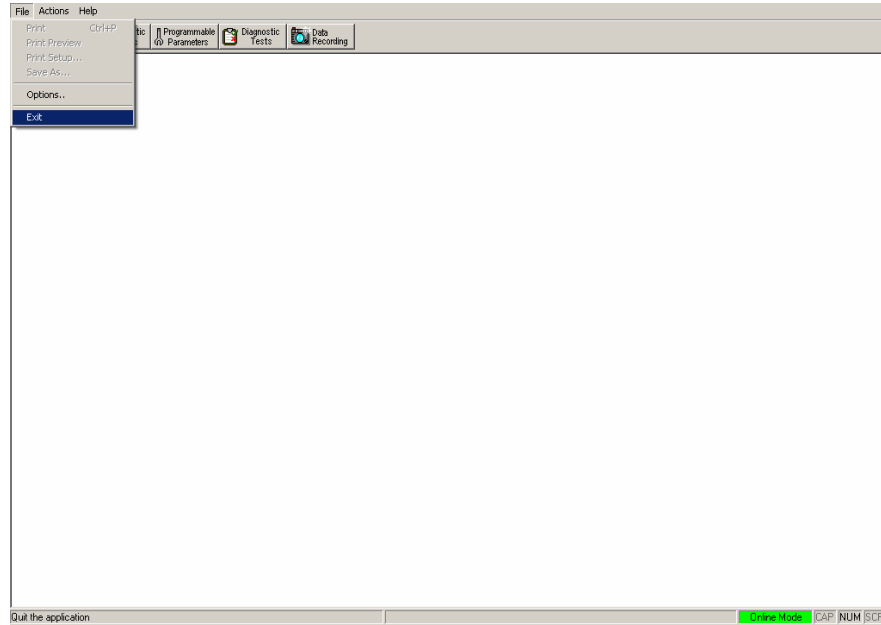


Figure 9.1

- 2) Select **Exit**.

Note: You may also exit the application by clicking on the NAVPAK logo in the left corner of the title bar, or by clicking on the Windows® Close button.

10.0 Emergency Shut Down

The system normally cleanses itself when the NAVPAK Diagnostic Software application is terminated correctly. But there is a possibility that the application may terminate abnormally or even lock up.

To force the application to terminate:

- 1) Press **CTRL_ALT_DEL** to bring up the Task Manager.
- 2) Select **NAVPAK Diagnostic Software**.
- 3) Click **End Task** to terminate the application.
- 4) Once you terminate the application, press **CTRL_ALT_DEL** again.
- 5) Highlight **xVDS**, and click **End Task** to terminate the server.

11.0 Uninstall NAVPAK Diagnostic Software

There are two methods to uninstall this software:

- Method 1
- Method 2

Method 1

To uninstall the application:

- 1) From the Windows® desktop, select **Start**.
- 2) Select **Programs**.
- 3) Select **NAVPAK Systems** ▶ **Engine Diagnostics** ▶ **Uninstall**.

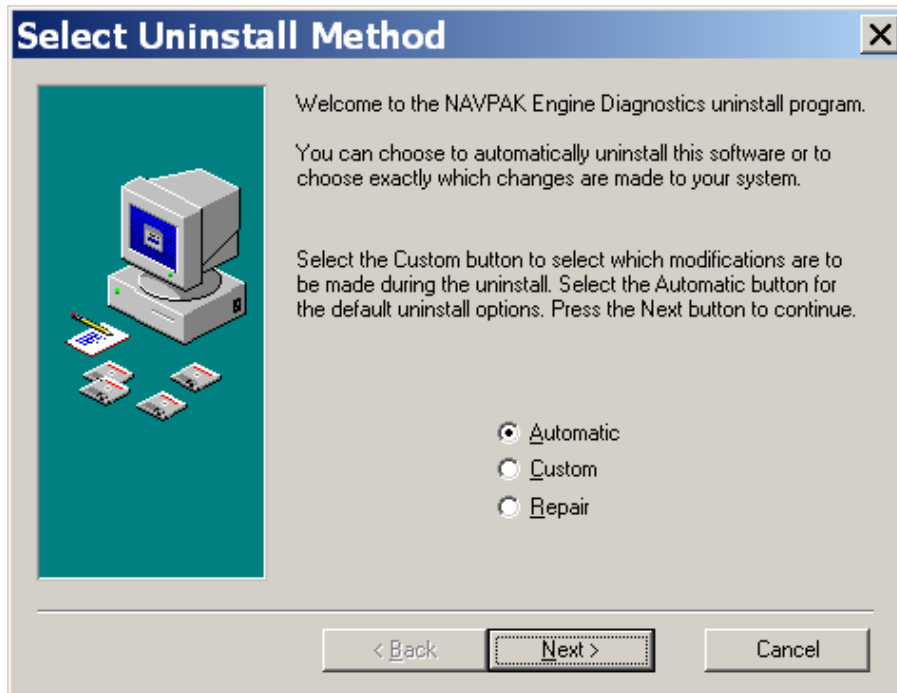


Figure 11.1

- 4) Select **Automatic**.
- 5) Click **Next**.
- 6) Follow the on-screen instructions to complete the uninstall process.

Method 2

To uninstall the application:

- 1) From the Windows® desktop, select **Start**.
- 2) Select **Settings ▶ Control Panel**.
- 3) Double-click on **Add/Remove Programs**.

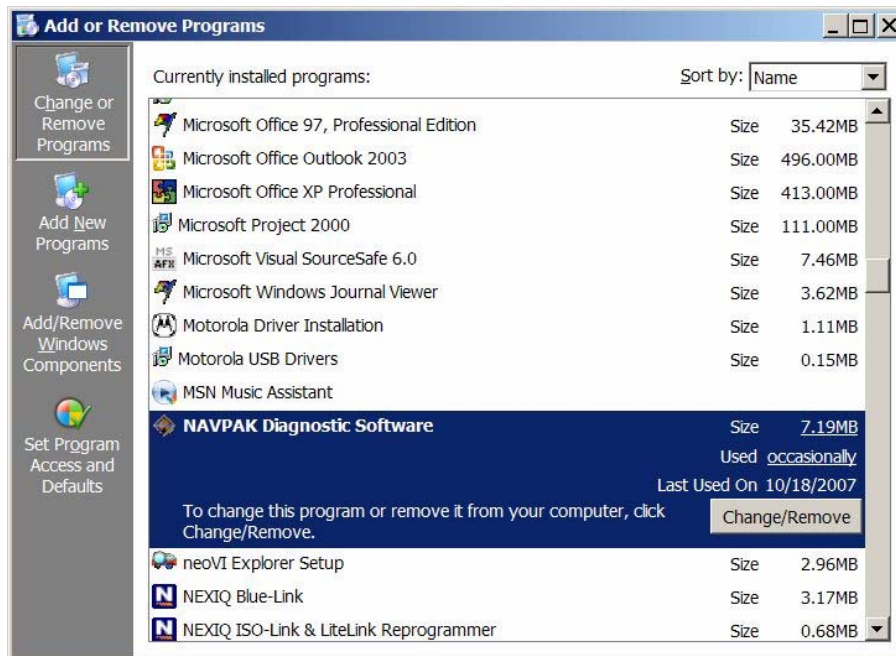


Figure 11.2

- 4) Locate **NAVPAK Diagnostic Software** in the list of Currently installed programs.
- 5) Click on the application to highlight it.
- 6) Click on the **Change/Remove** button to remove the program from your computer.

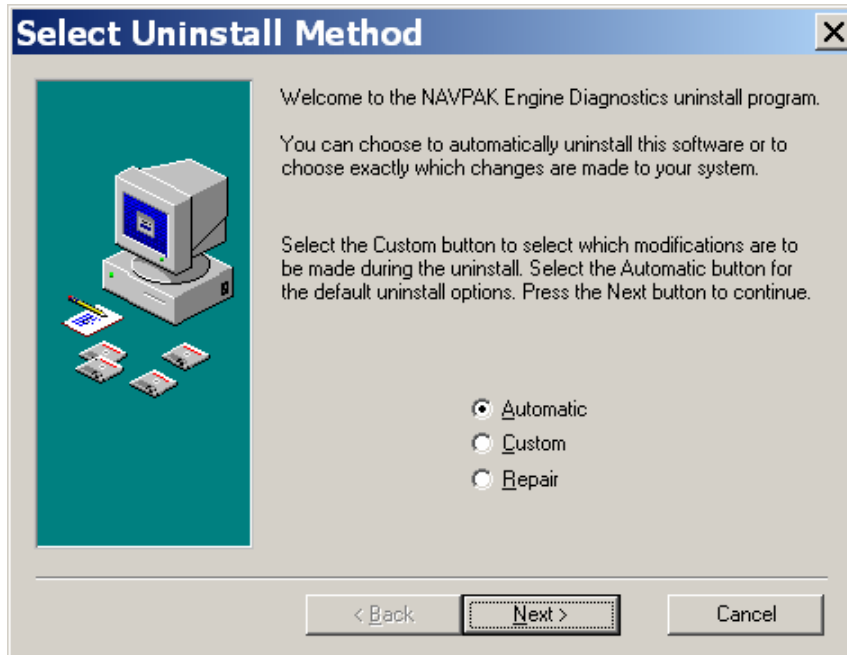


Figure 11.3

- 7) Select **Automatic**.
- 8) Click **Next**.
- 9) Follow the on-screen instructions to complete the uninstall process.