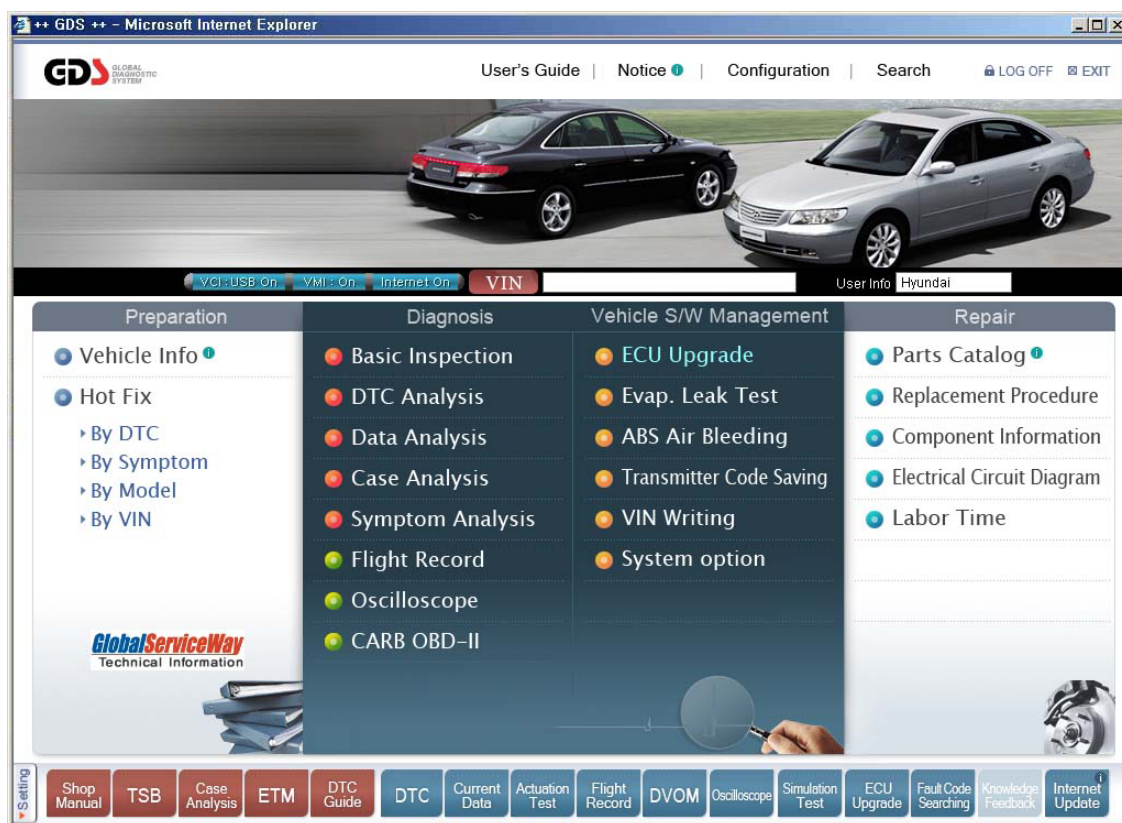# GDS - Diagnosis

Ver. 07. 06. 2006

2

Basic inspection

| GDS - Diagnosis | Module: A–04-001 (p.01) |

The "Basic Inspection" function provides standard check lists for various vehicle systems.

After entering the results, clicking the "Save" button will store the results.

These inspection sheets are saved locally; selecting the vehicle from the VIN screen at a later date will allow retrieval of these forms.

Inspection sheets may be printer by clicking on the printer icon located at the upper right-hand section of the form.

Engine System

Figure 1. Basic Inspection - Engine System

Figure 2. Basic Inspection – Print function

3

T/M and Driving System

Figure 3. Basic Inspection – T/M and Driving System

Brake and Steering System

Figure 4. Basic Inspection – Brake and Steering System

Others

Figure 5. Basic Inspection – Other Systems

Parts

Figure 6. Basic Inspection – Parts

	DTC Analysis	

GDS - Diagnosis   Module: A–04-002 (p.01)

The "DTC Analysis" function retrieves DTC data from a specific system and retrieves diagnostic procedures/TSB data for any DTCs found.

There are three ways to access this function:

- Select   "DTC Analysis" from the main page.
- Select "Go To DTC Analysis" from the "Fault Code Searching" window after selecting a specific DTC.
- Select the "DTC" button from the bottom of the main page.

DTC Searching

Configure setting for the diagnosis through the communication between VCI and vehicle control modules. Next, start diagnosis through the communication between VCI and vehicle control module by selecting the "DTC Analysis" menu as shown in [Figure 1].
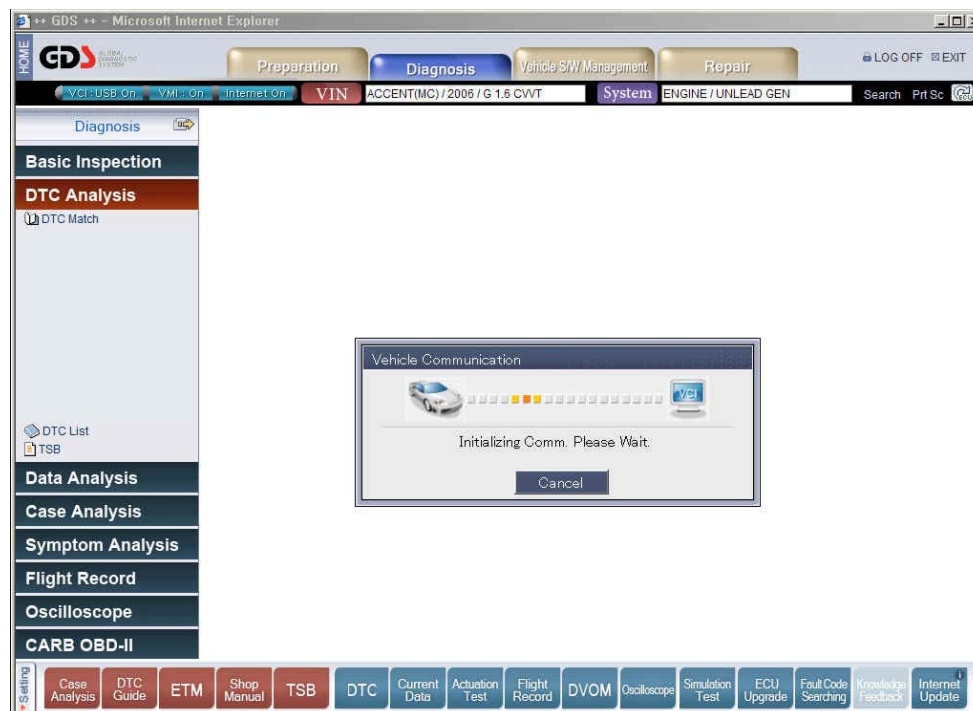
Figure 1. DTC Analysis – Communication Open

DTC Result

After communication with the ECU is established, DTC data will be retrieved and displayed on the upper portion of the screen. Freeze Frame data, if applicable, will display below the retrieved DTCs.

On the left-hand side of the screen, links to supported diagnostic procedures for the retrieved DTCs will be automatically displayed under the "Match On" section.
Selecting "Match Off-All" will display links to supported DTC procedures for all available DTCs.
Select a DTC procedure for detailed diagnosis information, including access to component-level and system-level wiring diagrams.

Selecting "TSB" will cause the GDS to search for TSB data related to retrieved DTCs.

Figure 2. DTC Analysis – DTC Result

DTC Display

The state of a DTC is shown in the "State" field on the right-hand side of the screen. ("H" indicates a history code for supported systems; "P" indicates a pending code for supported systems.) In addition, the "DTC Status" function is available on supported systems to provide more information regarding a specific DTC.

The DTC display will update every 25 seconds; the display may be updated manually by selecting "DTC Analysis".

The screen configuration may be changed using the appropriate icons located at the upper-right portion of the display."

Figure 3. DTC Analysis - DTC Display-Split screen
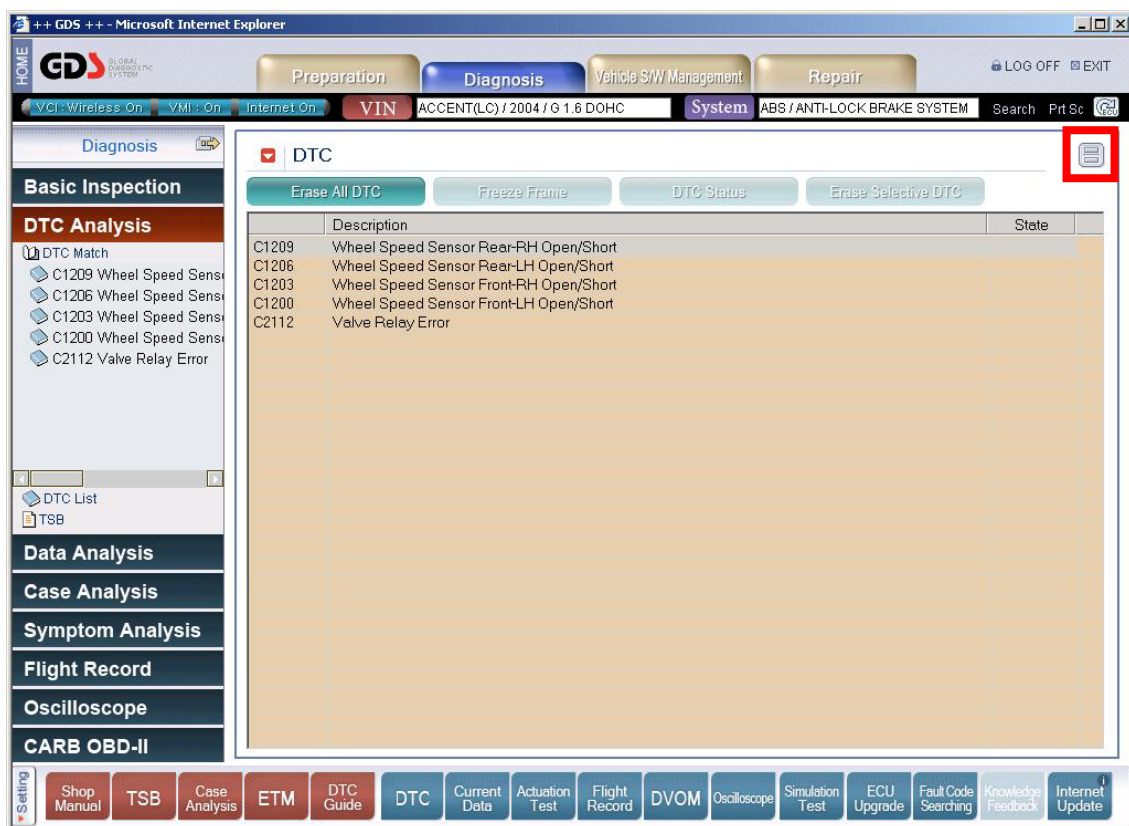
Figure 4. DTC Analysis - DTC Display-Full screen

DTC Erase

Erase All DTC

Selecting the "Erase All DTC" button will clear DTC data in the current ECU.
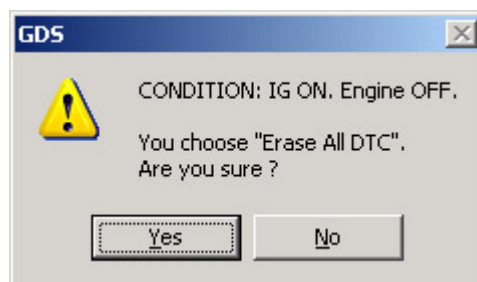
Figure 5. DTC Analysis - Erase All DTC

Erase Selective DTC

"Erase Selective DTC" button function is for erasing the selected DTC information form the assigned control module. "Erase Selective DTC" function is only for supported control modules. To erase DTC item, first choose the item and press "Erase Selective DTC" button.

Freeze Frame Display

The FREEZE FRAME DATA displays the data values stored in the Engine Control Module at the point when the first confirmed DTC (Engine ECU Only) is detected.
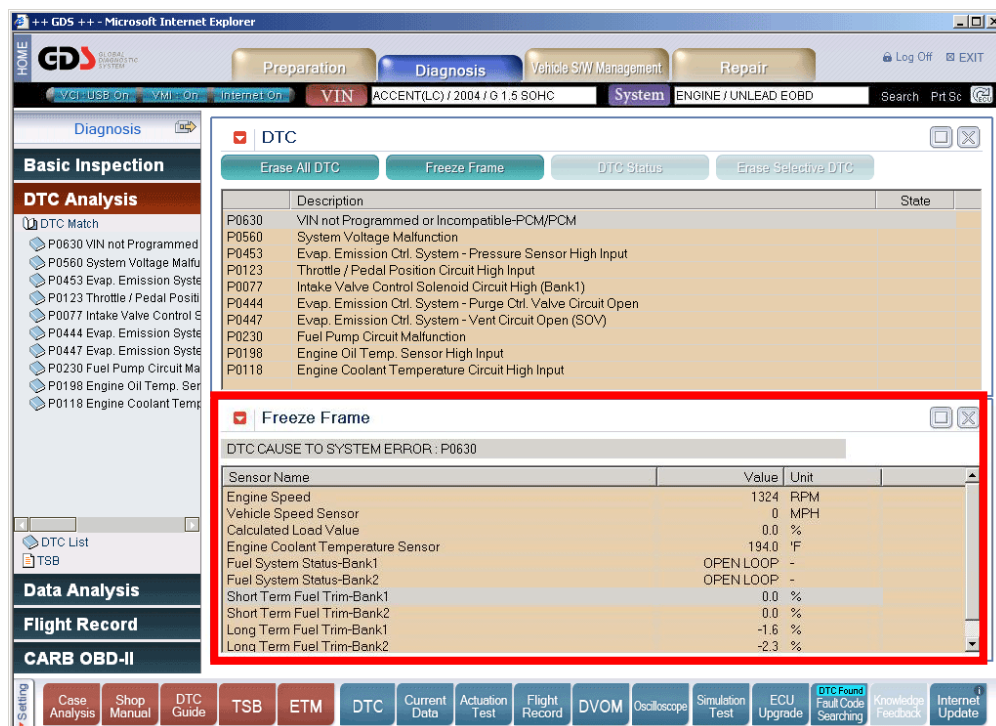
Figure 6. DTC Analysis – Freeze Frame

DTC Guide

After selecting a DTC procedure from the left-hand menu, the following options (dependent on specific DTC) will be displayed:" Component-level and system-level wiring diagrams (DTC dependent) are also available.

- **General Information**
- **Scan tool Diagnostics**
- **Inspection/Repair**
- **Verification of Vehicle Repair**
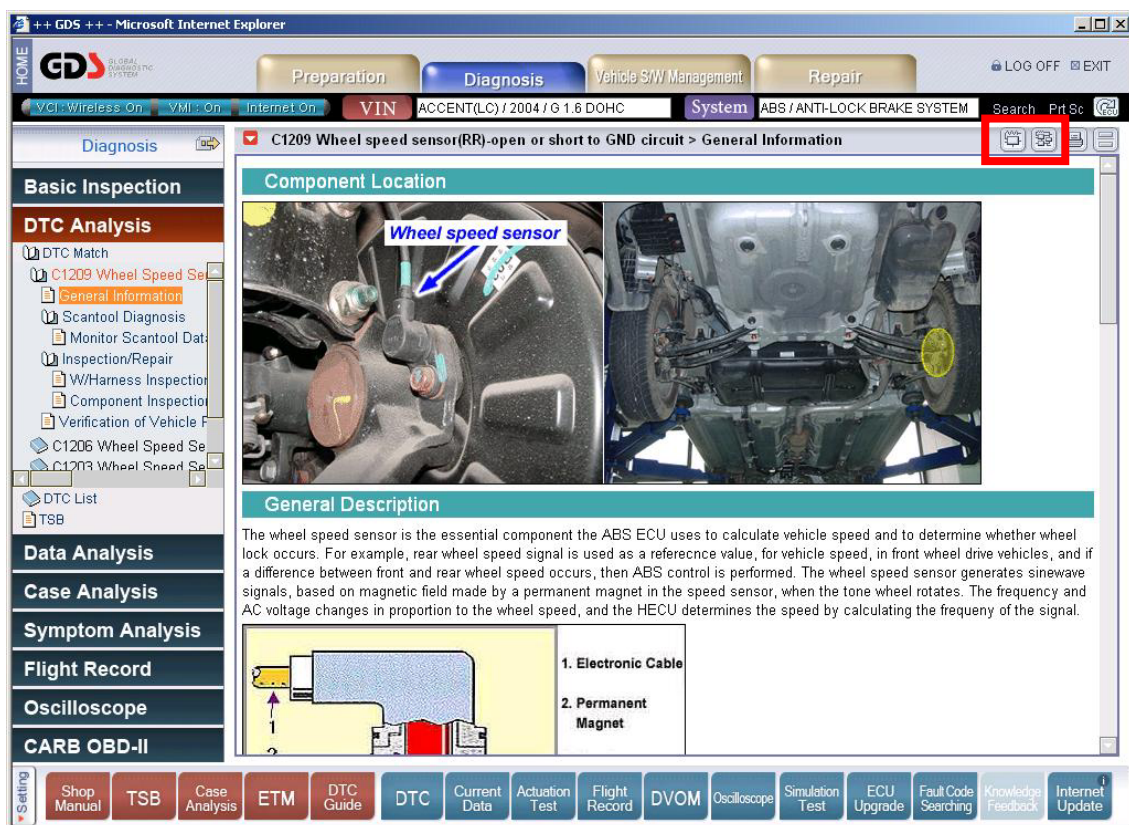
Figure 7. DTC Contents – General Information
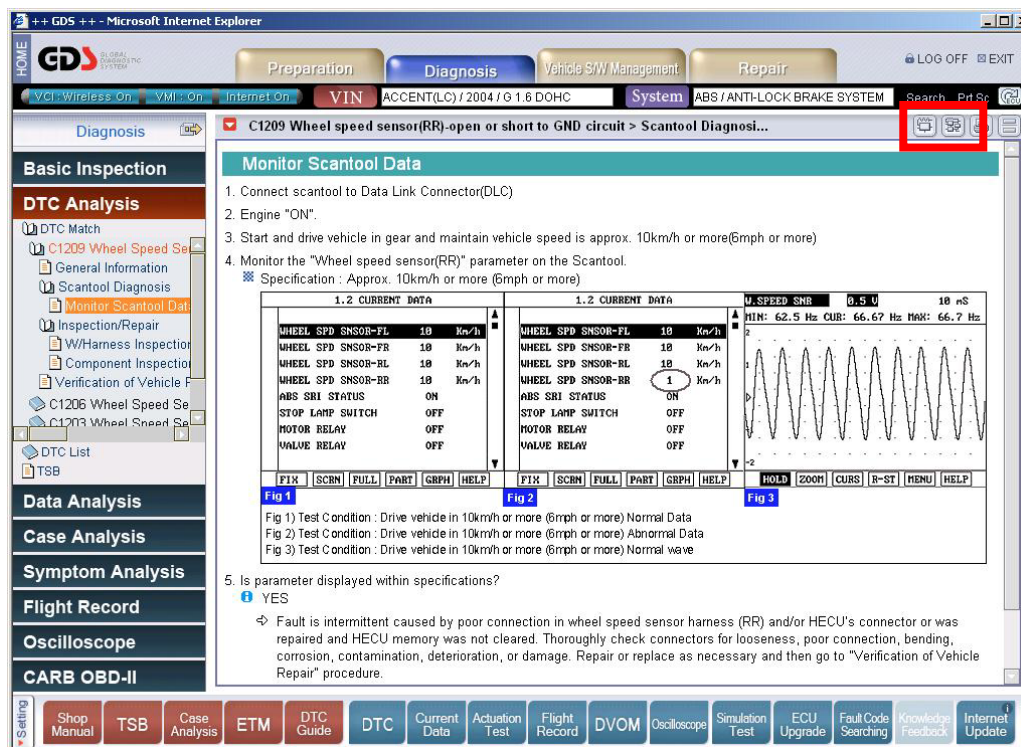
Figure 8. DTC Contents – Scantool Diagnostics
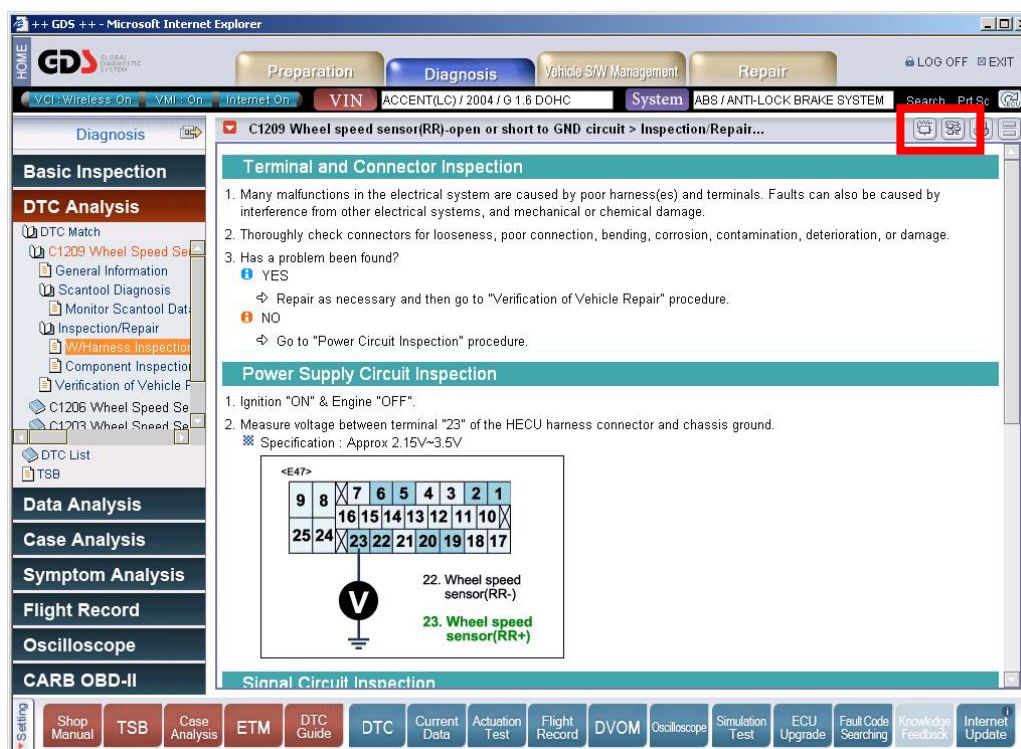
Figure 9. DTC Contents – Inspection/Repair
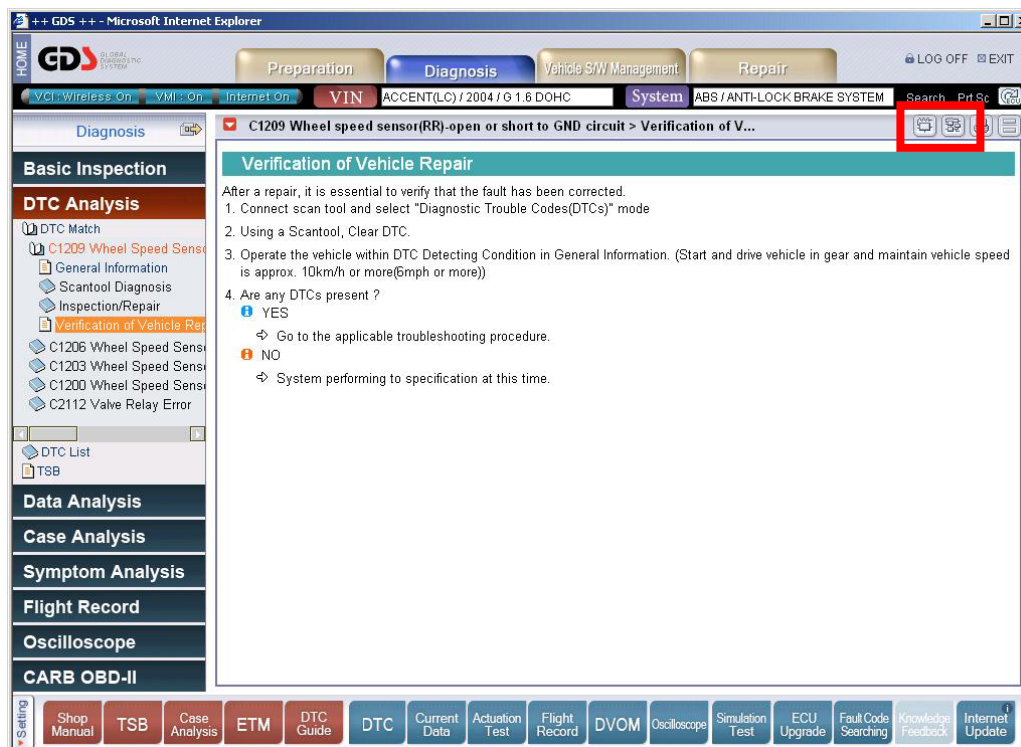
Figure 10. DTC Contents – Verification of Vehicle Repair
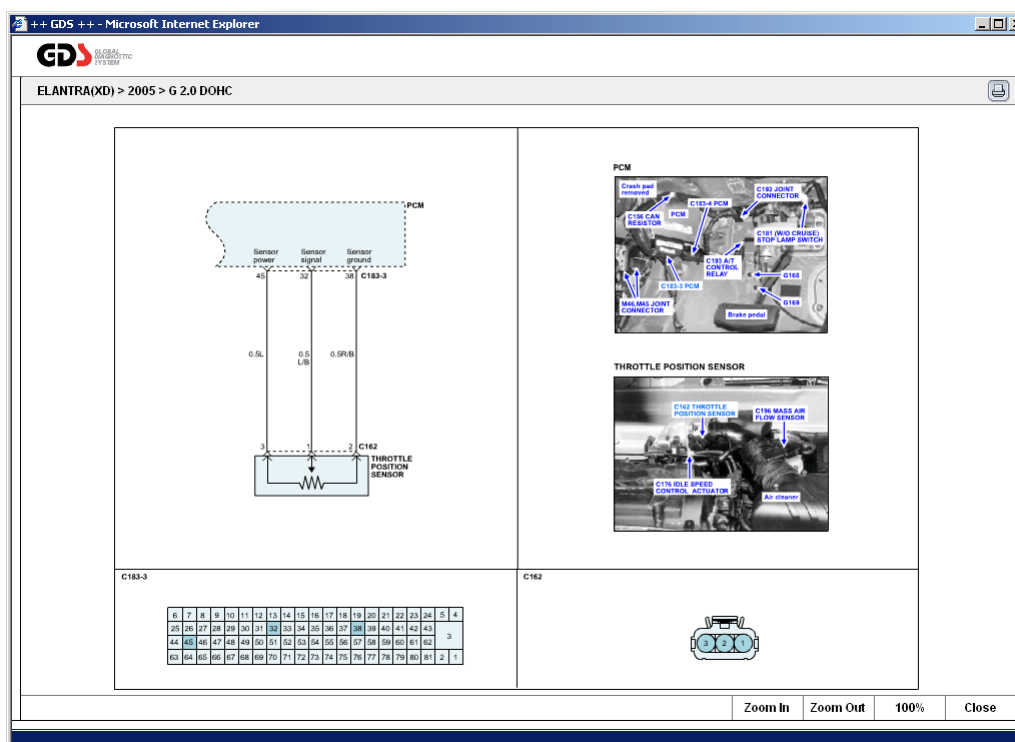
Figure 11. DTC Contents – Component Circuit Diagram
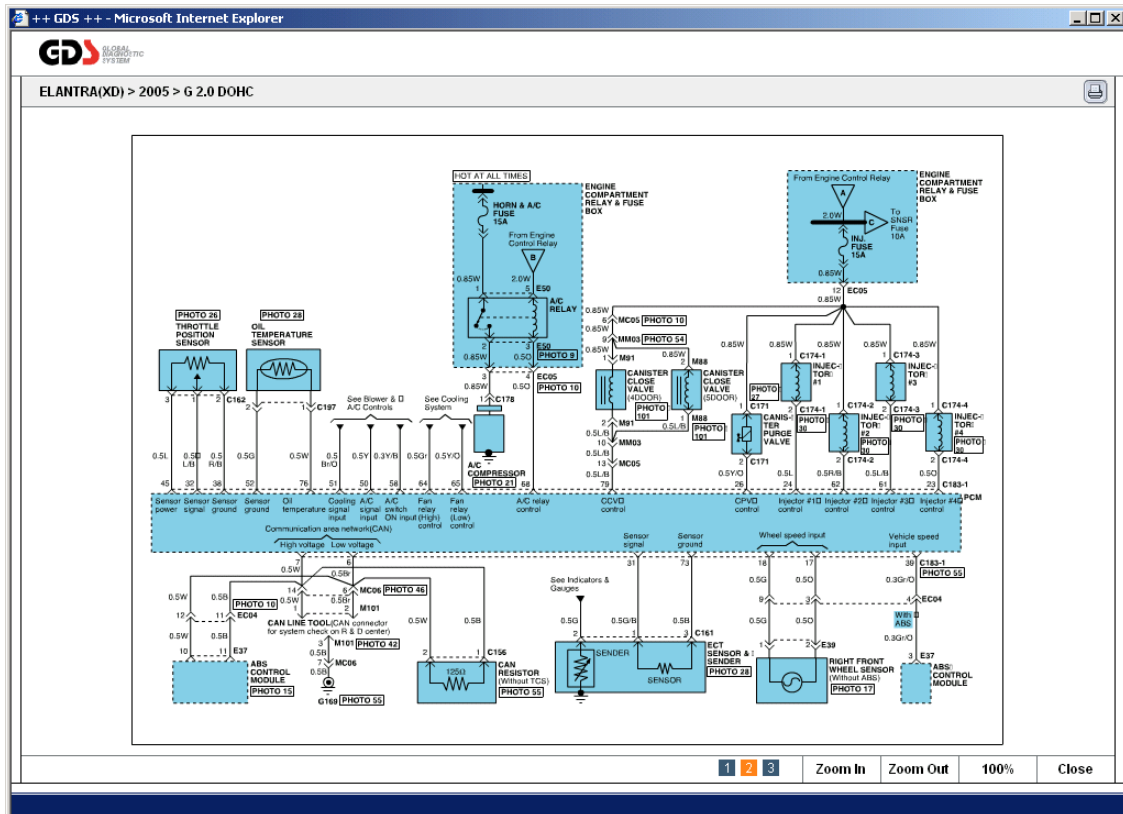
Figure 12. DTC Contents – Full Circuit Diagram

Data Analysis

GDS - Diagnosis   **Module: A–04-003 (p.01)**

To monitor ECU input/output information (Current Data), the user may select "Data Analysis" from the main page or "Current Data" from the bottom of the screen."

Figure 1. Data Analysis

Accessing Current Data

Configure the VCI and select the vehicle in the same manner as for DTC Analysis.

Monitoring for Current Data

The screen will display Current Data and DTC data in a split-screen view as shown below. Expand the Current Data window by selecting the icon marked.

Note: The speed GDS updates data parameters (refresh rate) depends on the communication protocol used by the ECU for data transmission.

If you want to view Current Data on Full-screen, click the button marked as shown below.

Figure 2. Data Analysis – Monitoring

The Functions buttons that are active in the Current Data page are shown below.

Icon	Description
Selective Display ⇕	Function to refresh data values for specific items. It toggles with "Normal Display"
Normal Display ⇕	Functions to refresh data values for all items. It toggles with "Selective Display"
Full List ⇕	Function to show Current Data items in two divisions (right and left) to show more items. It toggles with "Standard List"
Standard List ⇕	Function to show Current Data items in one division. It toggles with "Full List"
Text ⇕	Function to show Current Data values in text format. It toggles with "Graph"
Graph ⇕	Function to show Current Data values in graph format. It toggles with "Text"
Items List	Function to change displayed the selected Current Data items in Graph mode.
Reset Min.Max.	Function to reset the Max. Or min. value of Current Data in Graph mode
Record	Function to save "Current Data" in Data File Form to the PC or VCI.

Normal / Selective Display

The "Selective Display" function updates selected data parameters (maximum of 8). The default mode is "Normal Display" (all data parameters are updated). Select data parameters by checking the box next to the parameter name; click "Selective Display" to enable the function. Click "Normal Display" to switch back to the default mode.

Figure 3. Data Analysis – Selective Display

Full List / Standard List

The difference between "Full List" and "Standard List" is the output method for the "Current Data" items. "Standard List" shows items in one column and "Full List" shows in two divisions.
"Selective Display" and "Graph" functions are not available in "Full List" mode.

Text / Graph

The default display format is "Text" mode. To switch to "Graph" mode, perform the following:

- Select up to 8 data parameters.
- Switch to "Selective Display" mode.
- Click the "Graph" button.
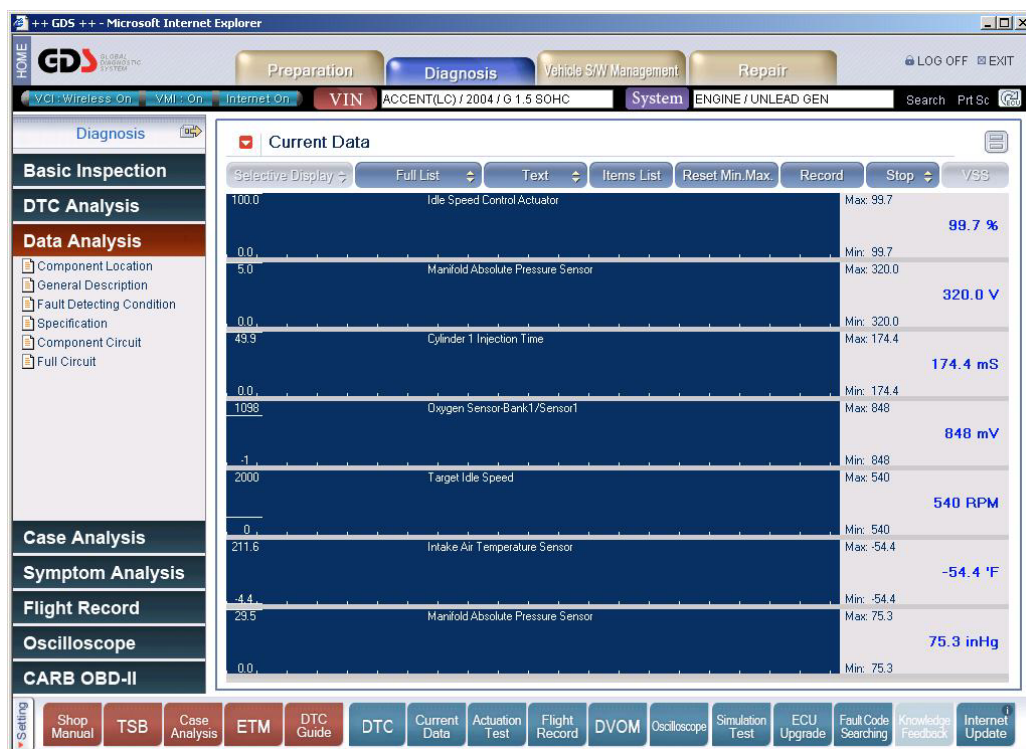
Figure 4. Data Analysis -Graph

In Graph mode, minimum and maximum values will display on the right-hand side of the screen; use the "Reset Min/Max" button to reset these values.

To add or remove items from the graph, select the "Item List" button. Currently selected items are marked with an asterisk (*). Click on an item to add or remove (8 items maximum). Click the "Item List" button to switch back to "Graph" mode.

Figure 5. Data Analysis -Graph-Min & Max

Figure 6. Data Analysis -Display item change

Current Data Analysis Functions
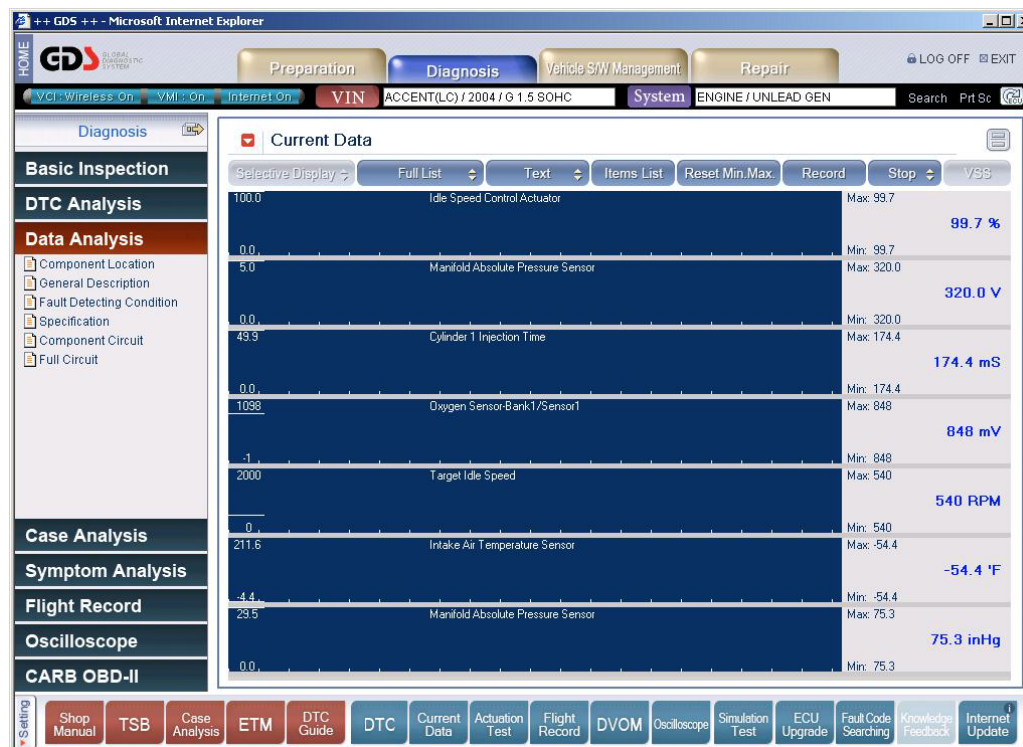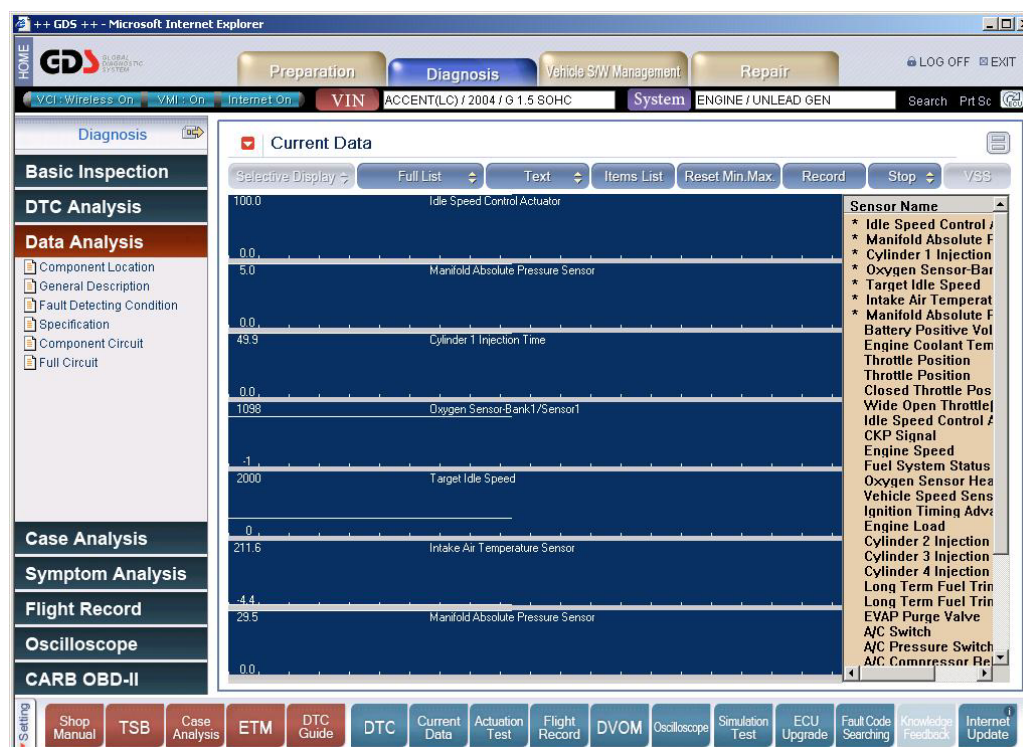
When using "Text" mode, additional information is available for supported Current Data items:

- Component Location - Shows the location of the selected component.

- General description - General information related to the selected component.

- Fault Detecting Condition - DTC enable conditions related to the selected component.

- Specification - Applicable specifications for the selected component.

- Component Circuit - Wiring diagram showing only the selected component and related wiring.

- Full Circuit - Full wiring diagram for the system related to the selected component.

Click on a Current Data Parameter to access this information.

Sample screens are shown on the following pages.

Figure 7. Data Analysis Contents– Component Location

Figure 8. Data Analysis Contents– General Description

Figure 9. Data Analysis Contents– Fault Detecting Condition

Figure 10. Data Analysis Contents– Specification
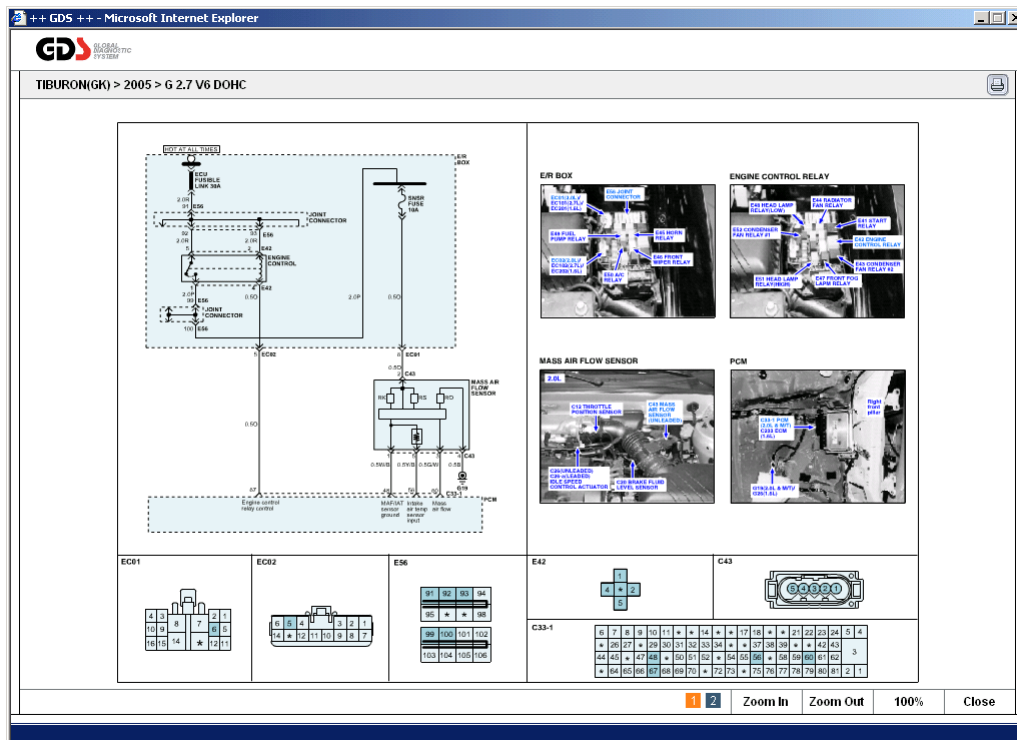
Figure 11. Data Analysis Contents– Component Circuit
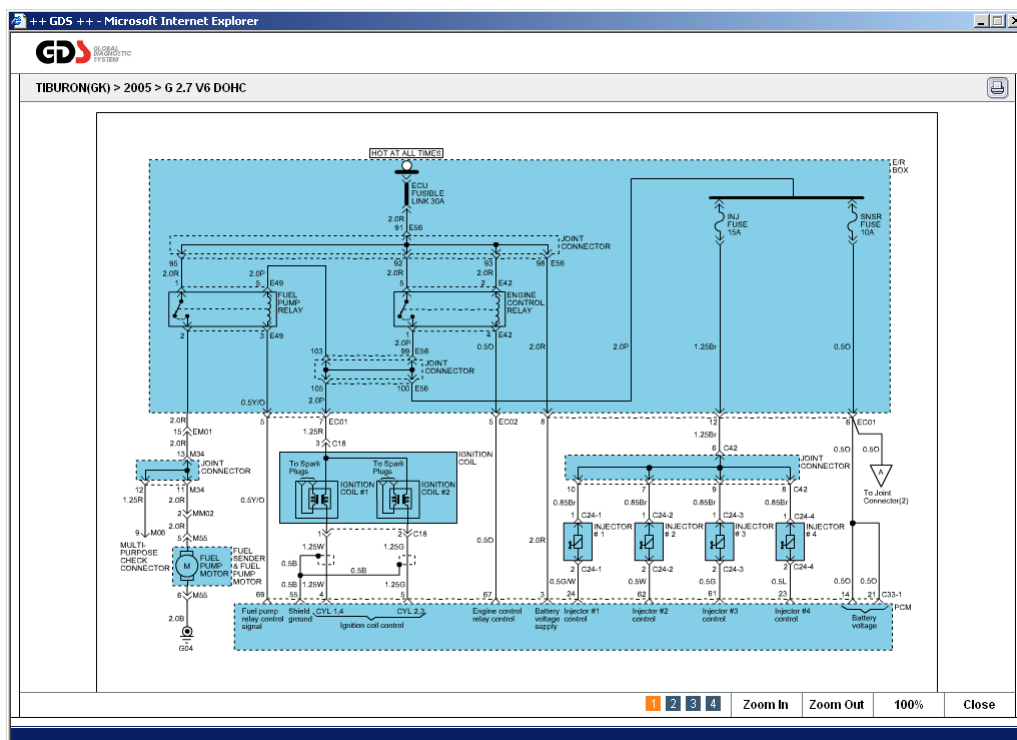
Figure 12. Data Analysis Contents– Full Circuit

	Case Analysis	

"Case Analysis" function in the "Diagnostic Guide" menu classifies diagnostic guide cases into module groups (Engine, Transmission, and brakes…). It also classifies specifically into symptoms and supports the most effective repair cases for each symptom.

In Case Analysis, the "Match On" mode only checks the selected symptoms for the selected vehicle in "**Vehicle Selection**", and "Match Off" mode will access every diagnostic case for selected vehicle.

- Case Match : Function to access diagnostic cases only for the selected vehicle.
- Case List: Function to access diagnostic cases for all symptoms for selected vehicle.

There are two ways to use "Case Analysis" function. The first way is to use "Case Analysis" menu in "Diagnostic guide" section at the initial main page. The second way is to use "Case Analysis" menu after the selection of "Diagnosis" button in the main menu of the sub screen as shown in [Figure 1].

Case Match

When "Case Analysis" is selected, "Case Match" menu is displayed as default.

In "Case Match" menu, module groups that match the selected symptom will appear on the lower section, and name of the checked symptoms appear when the module group is selected. Number of matches, for the maintenance cases and the checked symptom name, will be shown on the screen.

Figure 1. Case Analysis-Match On

When the symptom is selected, diagnostic cases are listed in bulletin form on the right side of the page. If symptoms were not selected in the "Vehicle Selection "setup page, no symptom will appear in the left menu.

Case List

With the "Case List" menu selected, all the module groups with symptoms for the selected vehicle appear on the left menu.

The number of diagnostic cases matched for each symptom appears on the menu as well. On the right side, diagnostic cases appear in a bulletin form.

Figure 2. Case Analysis- Match Off-All

Case analysis open

When the user selects the subject name from the case list the Bulletin containing corresponding content for that case appears as a pop-up window.

Figure 3. Case Analysis-Contents Open

Symptom Analysis

GDS - GLOBAL DIAGNOSTIC SYSTEM

GiT - Global Information Technology

| GDS - Diagnosis | Module: A–04-005 (p.01) |

The "Symptom Analysis" function in the "Diagnostic Guide" menu allows the user to access symptom-based troubleshooting data.

The "Symptom Match" function retrieves symptom troubleshooting data based on the symptoms entered at the VIN screen.

The "Symptom List" function retrieves all available symptom troubleshooting data for the selected vehicle.
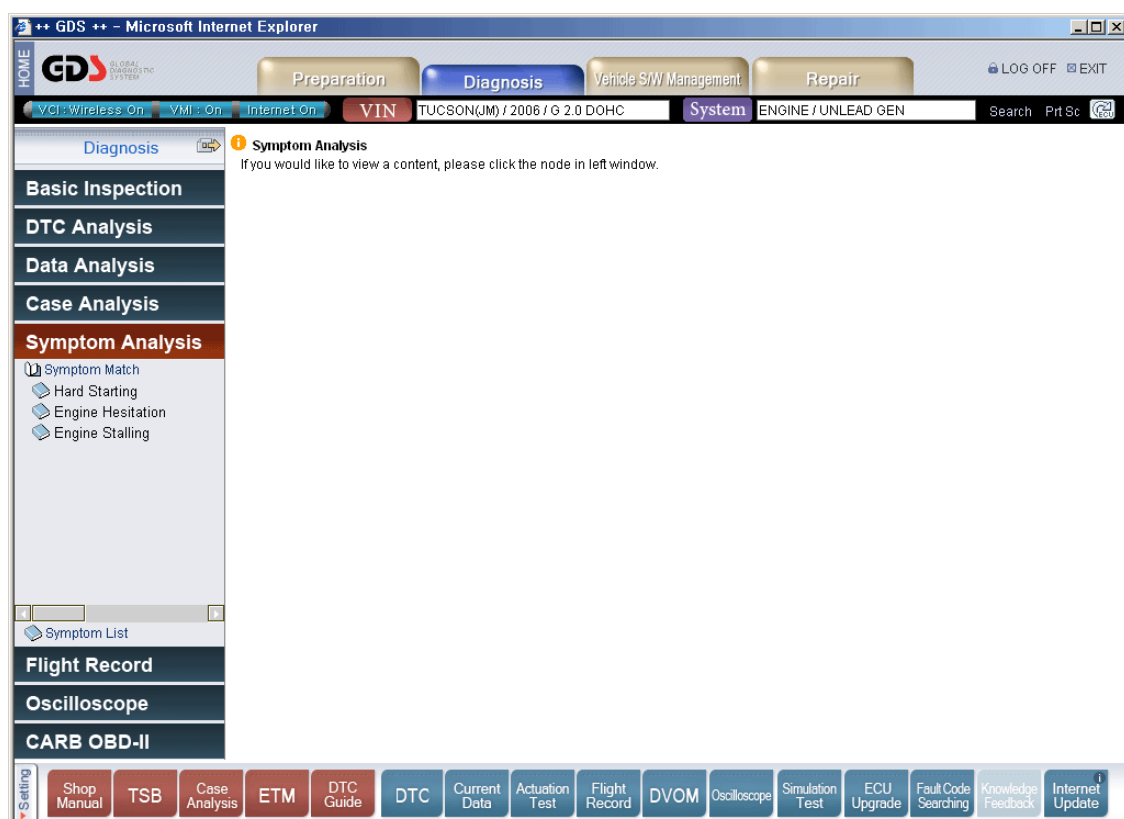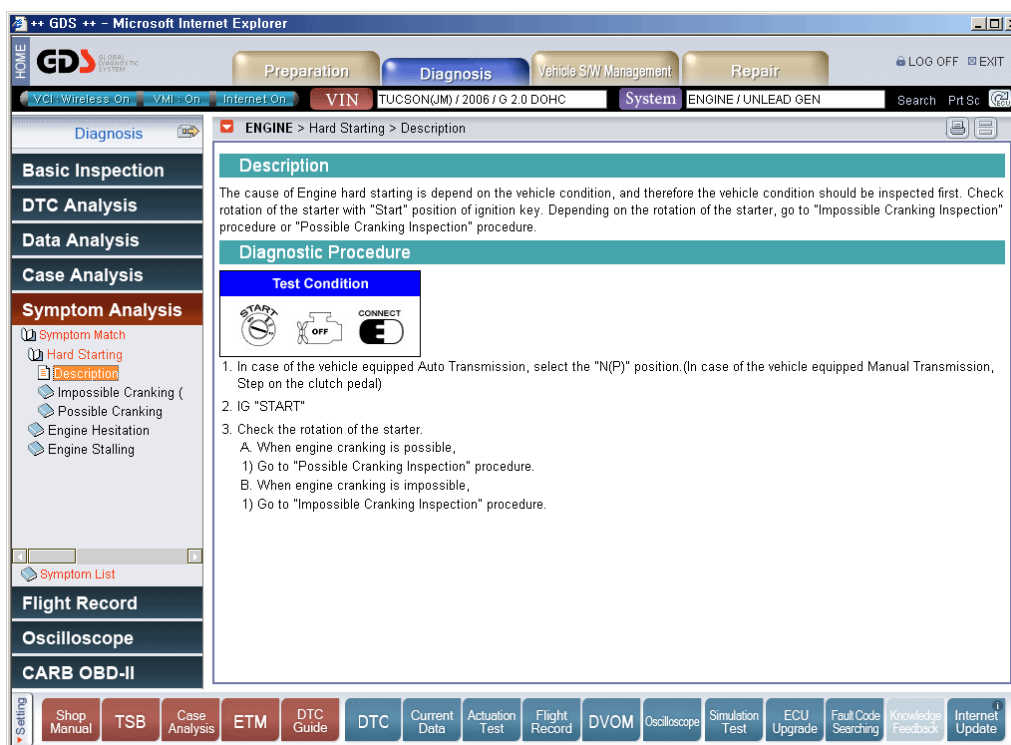

Figure 1. Symptom Analysis-Match On

Figure 2. Symptom Analysis- Match On-Item selection
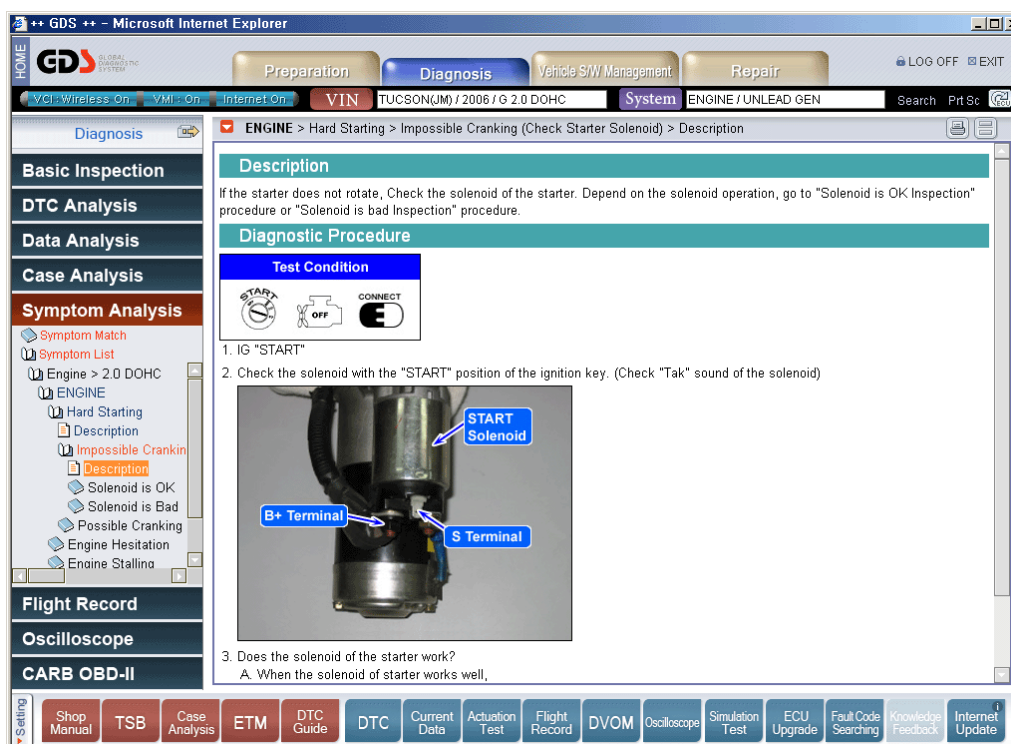
Figure 3. Symptom Analysis- Match Off-All

GDS GLOBAL DIAGNOSTIC SYSTEM	**Flight Record**	**Git** Global Information Technology

GDS - Diagnosis	**Module: A–04-006 (p.01)**

"Flight Record" function enables the user to record systems data in PC or VCI, and to analyze the data in various ways and time settings. The data copied or saved on PC can be reviewed at any time.

Selection of Record Item

By "Data Analysis" or "Current Data"

From the "Data Analysis" or "Current Data" functions, selecting the items to record,

Figure 1. Selection of Data Analysis

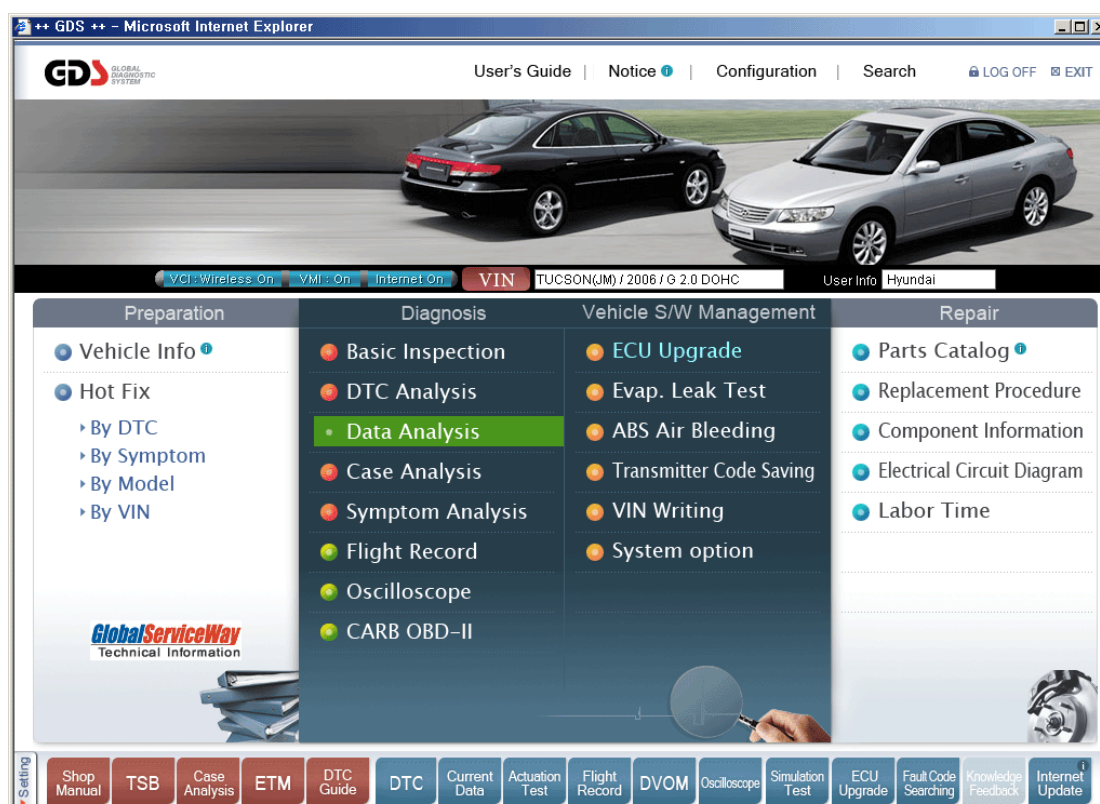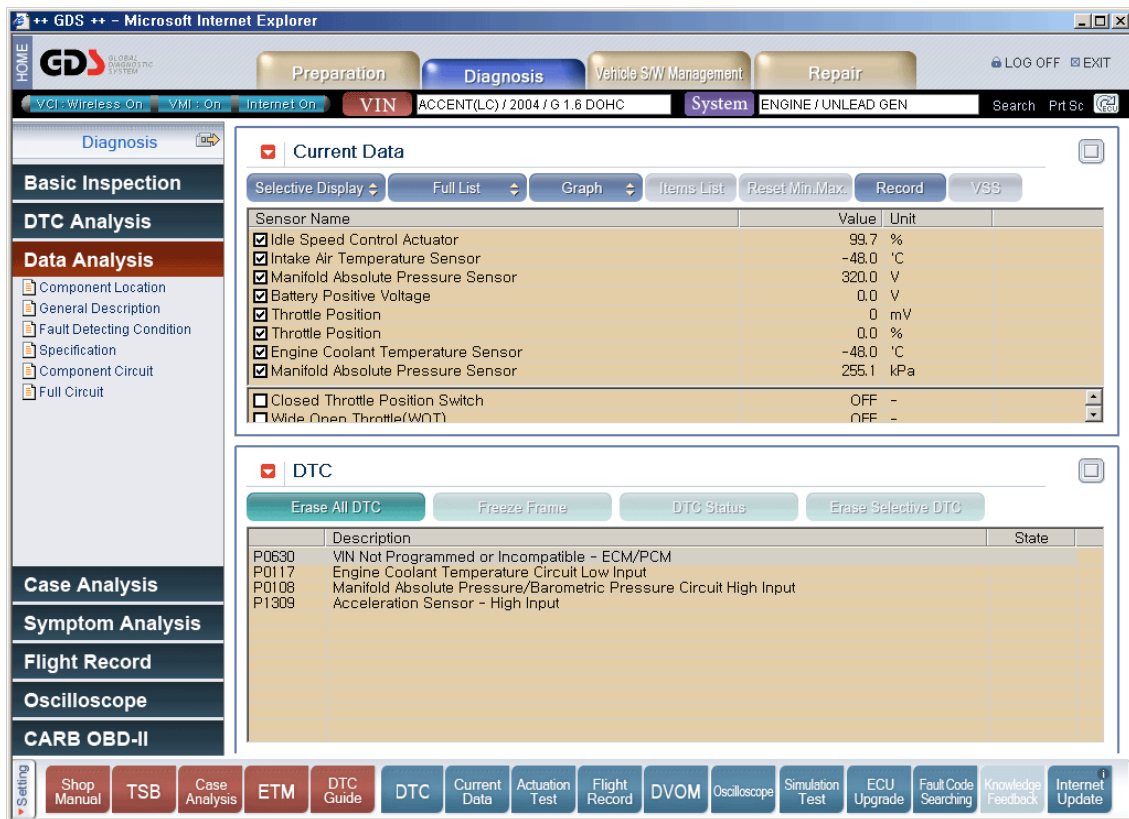**Figure 2. Select the item on Data Analysis page**

By "Flight Record"

Select "Flight Record" button on the initial page. "Flight Record" menu tips page shown in figure 4. If the selection of vehicle and system is not yet completed, "GDS VIN Search" page will appear instead of "Flight Record" menu tips page.
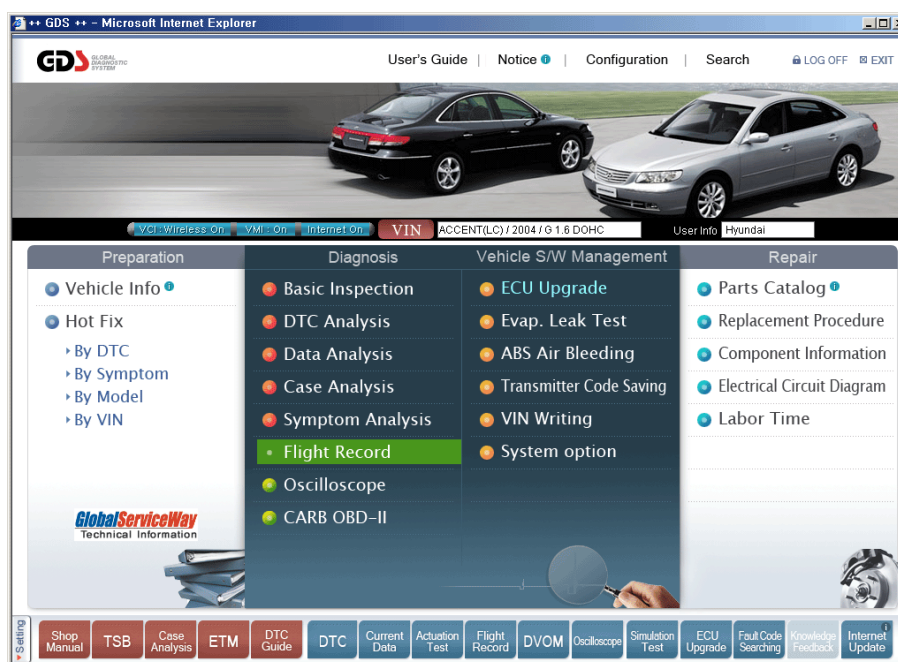

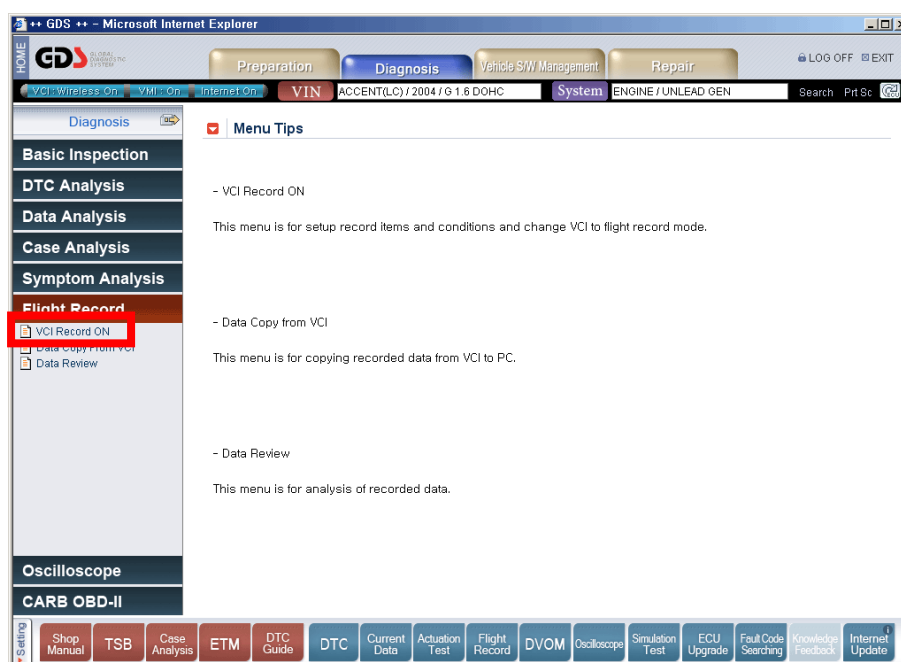**Figure 3. Select Flight Record**

Figure 4. Menu Tips of Flight Record

"VCI Record ON" menu is for setting up record items, conditions and change VCI to flight record mode. To change VCI module to Record mode, plug in VCI module and Trigger module on a vehicle. Cigar lighter socket connection is very important for automatic power On/Off of the VCI. Vehicle must be IG ON. VCI must be power ON. Check the VCI Power Status LED indicates "NORMAL". If not, you should stop record first. (Using "VCI Record OFF" Menu) When everything is ready, click "OK" button on the lower section of the page.
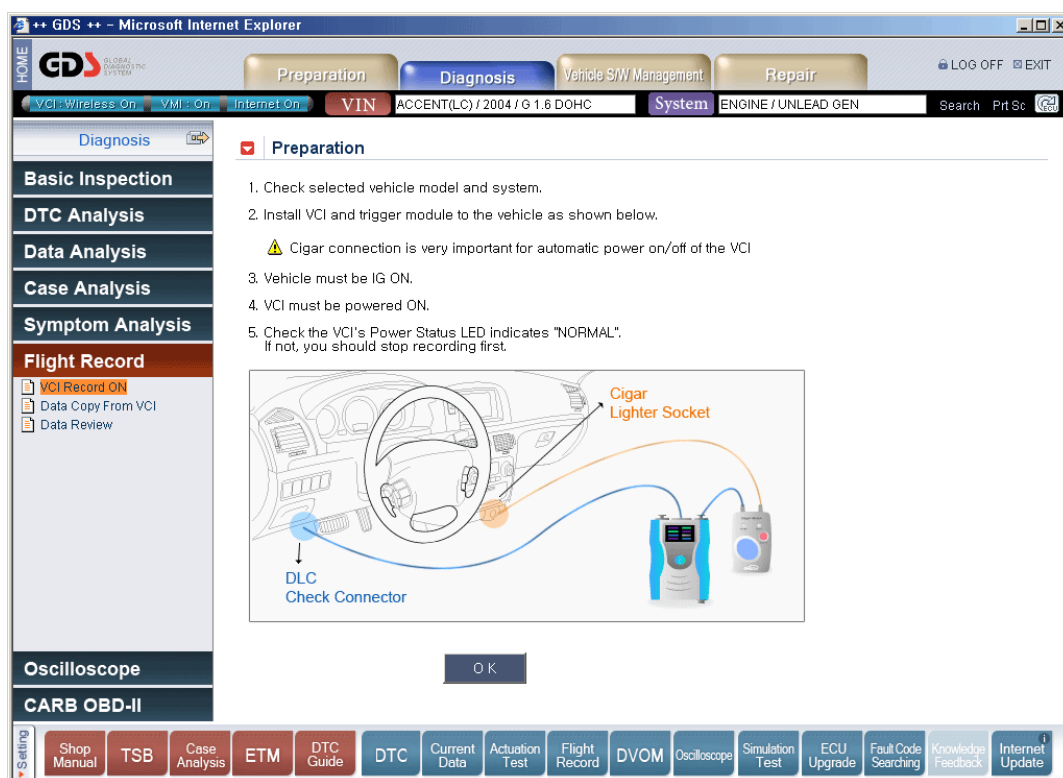

Figure 5. Preparation for VCI Record ON

PC tries a connection to download data from VCI. The window appears on the screen as shown in figure below to notify the connection.
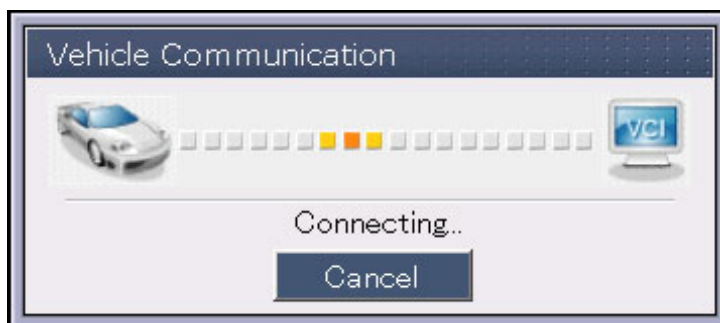

Figure 6. Vehicle Communication

When the communication is completed, selection page for the "Record Item" appears as shown in the figure below.
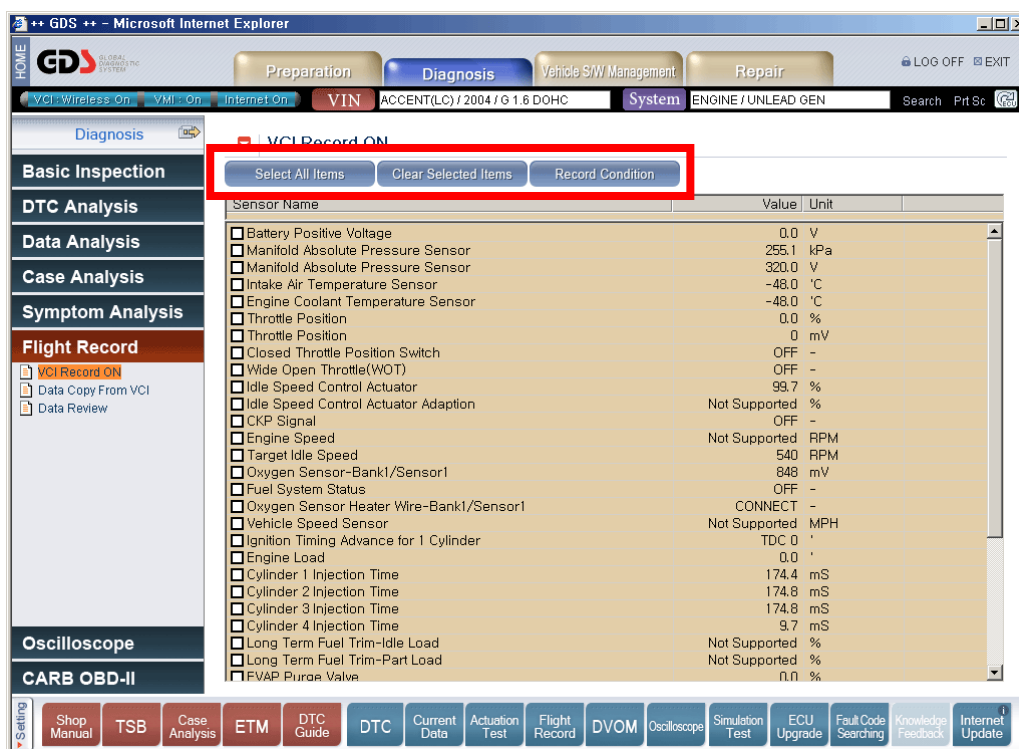

Figure 7. Select Items

Icon	Description
Select All Items	All the data will be checked.
Clear Selected Items	All the data will be unchecked.
Record Condition	Select the "Trigger Setting", "Recording Item" and "Record time for one Event" after the data selection process.

When "Record Condition" button is selected, "Record Condition" window appears on the screen for user to select the trigger type.

Operation of Flight Record to PC

From the "Data Analysis" or "Current Data" functions, after selecting the items to record, press the "Record" button.
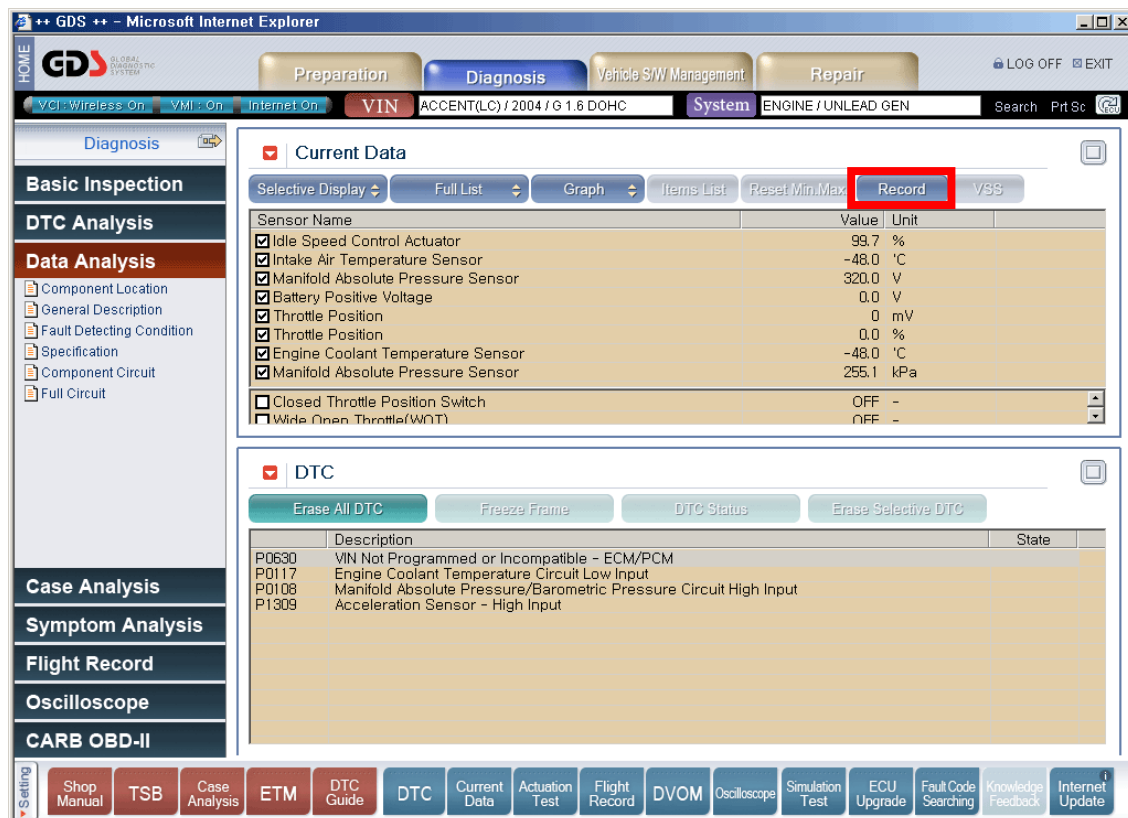

Figure 8. Select the item on Data Analysis page
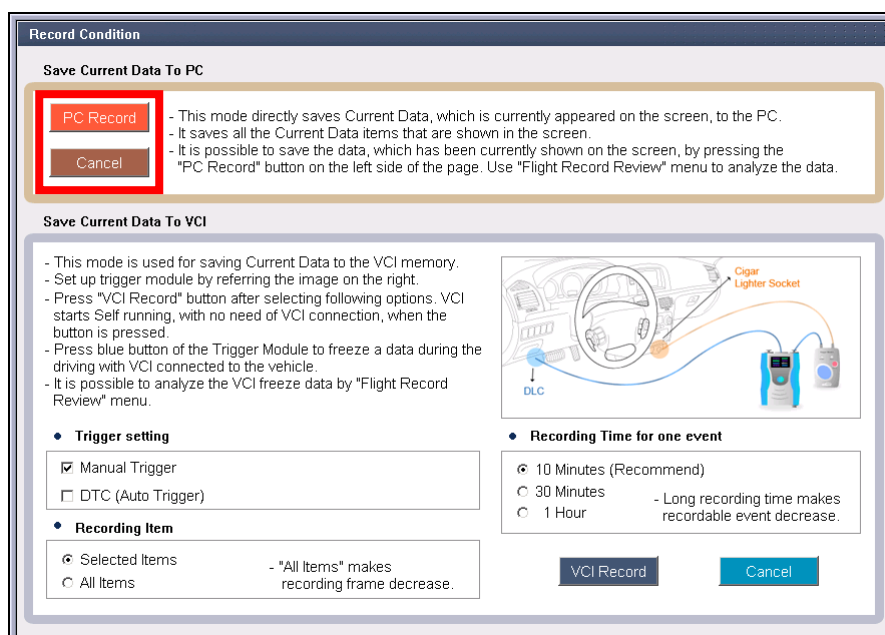
Select the "PC Record" button.
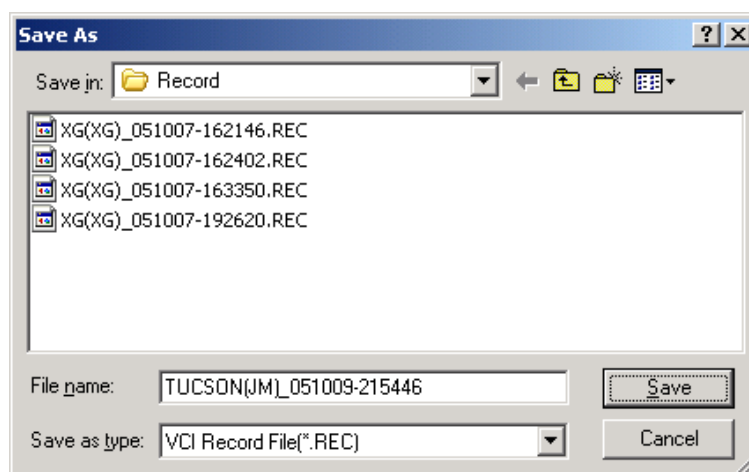

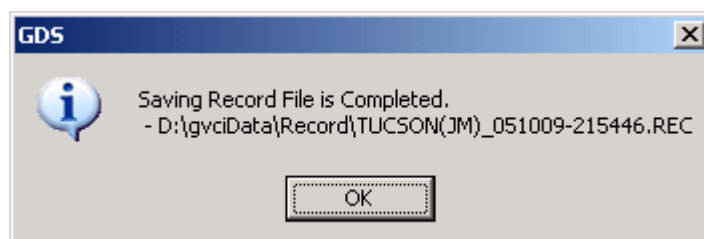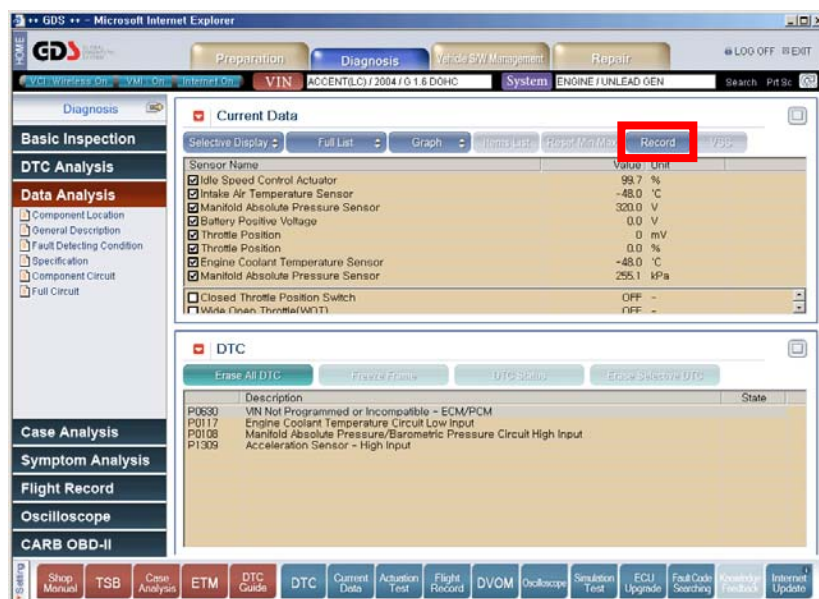**Figure 9. Record Condition window**

Figure 10. Save the Record File to PC

Figure 11. Complete the File saving

Operation of Flight Record to VCI

From the "Data Analysis" or "Current Data" functions, after selecting the items to record, press the "Record" button."

Figure 12. Select the item on Data Analysis page

Select the trigger type, recording item (All or Selected), and recording duration. Connect the VCI to the vehicle using the Trigger Module as shown.
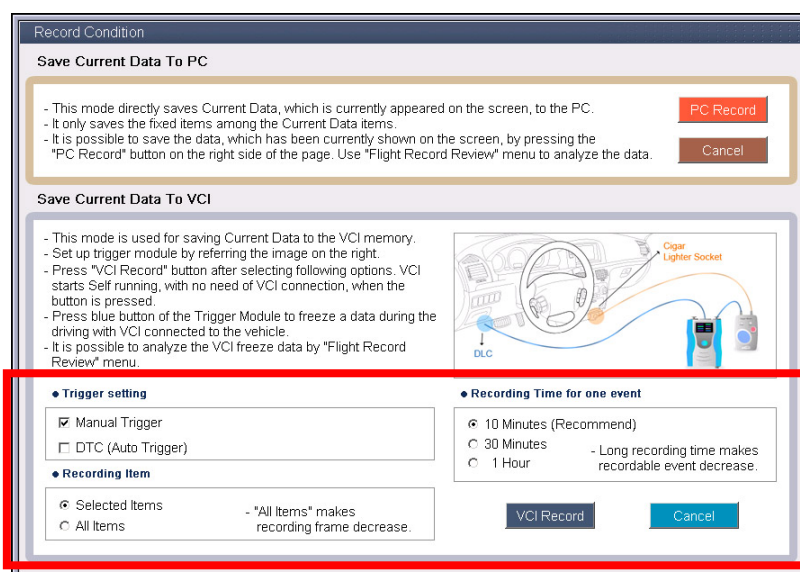
Figure 13. Record Condition

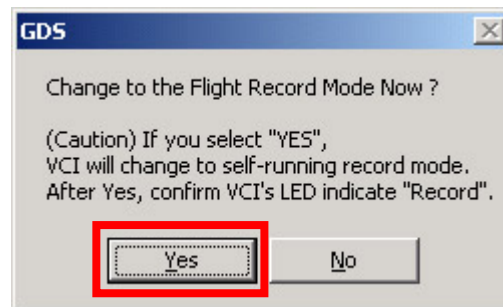Confirm the option to place the VCI into Record mode. If needed, confirm that previously saved data is OK to erase.

Figure 14. Confirm Change to Flight Record Mode

If there is unsaved data in the VCI a Warning will display (Figure 15). Click "Yes" to continue with flight record setup.
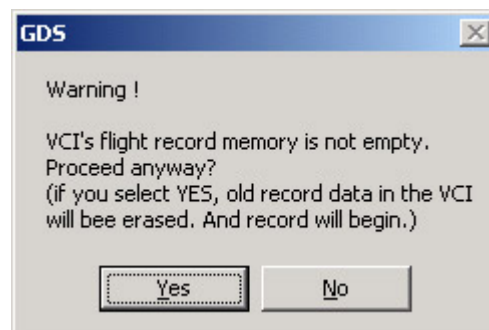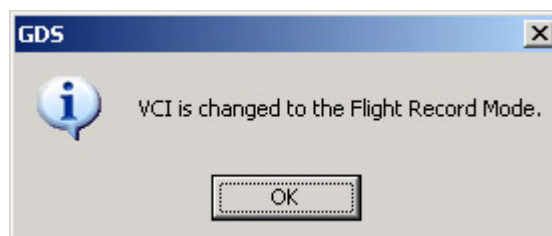

Figure 15. VCI Warning for deleting old data

Figure 16. Completion of the mode change

Check VCI and Trigger module are in record mode. The VCI Power LED will turn RED; the Vehicle Communication LED will flicker. The Trigger module Power and Ready LED's will be illuminated in the record mode.
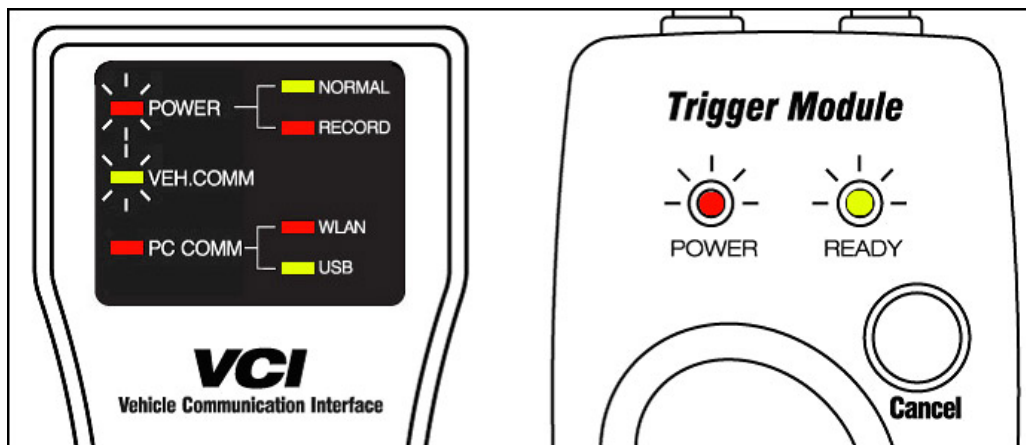
Figure 17. VCI Flight Record Mode

By pressing, "Enter" button during the flight record process the VCI stops collecting data and starts saving the data. The "Ready" Led will flicker for 10 seconds indicating the data is being saved in the VCI.

By pressing "Cancel" button during the "Ready" Led flickering the VCI cancels saving the data.
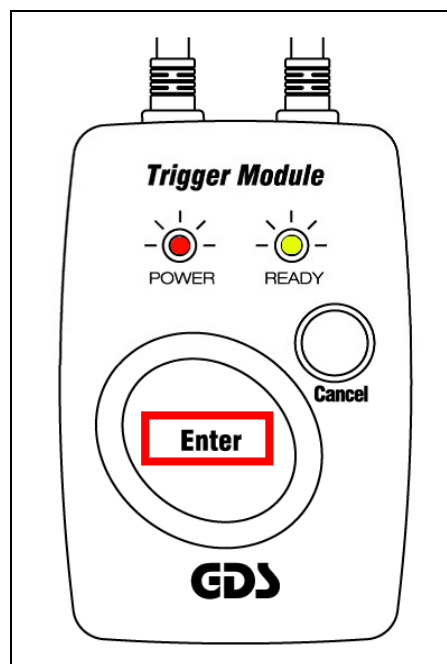
Figure 18. Press the "Enter" button

⚠ WARNING

- Do not use the Power switch of the VCI Module in Flight Record mode.
- VCI module and Trigger module automatically turn on/off depending on IG Key status.
- VCI module and Trigger module turn off after 10 seconds from IG key off and immediately turn on when IG Key is ON.

To release the VCI from Flight Record mode, Select the "DTC analysis or "Data Analysis" menu, then confirm as shown below.

Figure 19. Confirm VCI Record OFF

The VCI Power LED will illuminate as shown when Flight Recording is released.
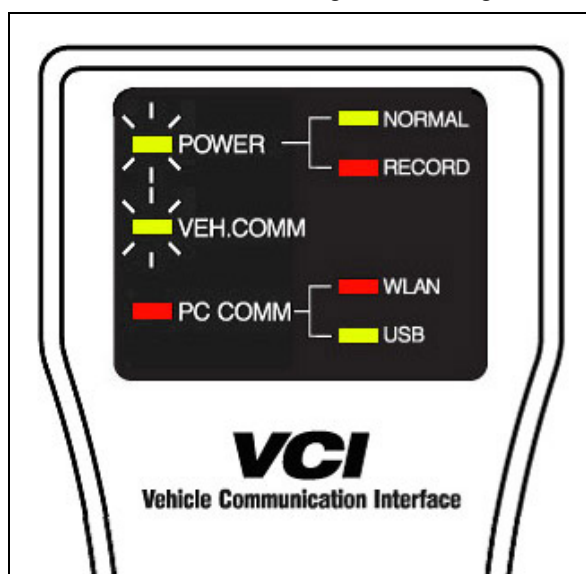
Figure 20. VCI Normal Mode

Flight Record Review
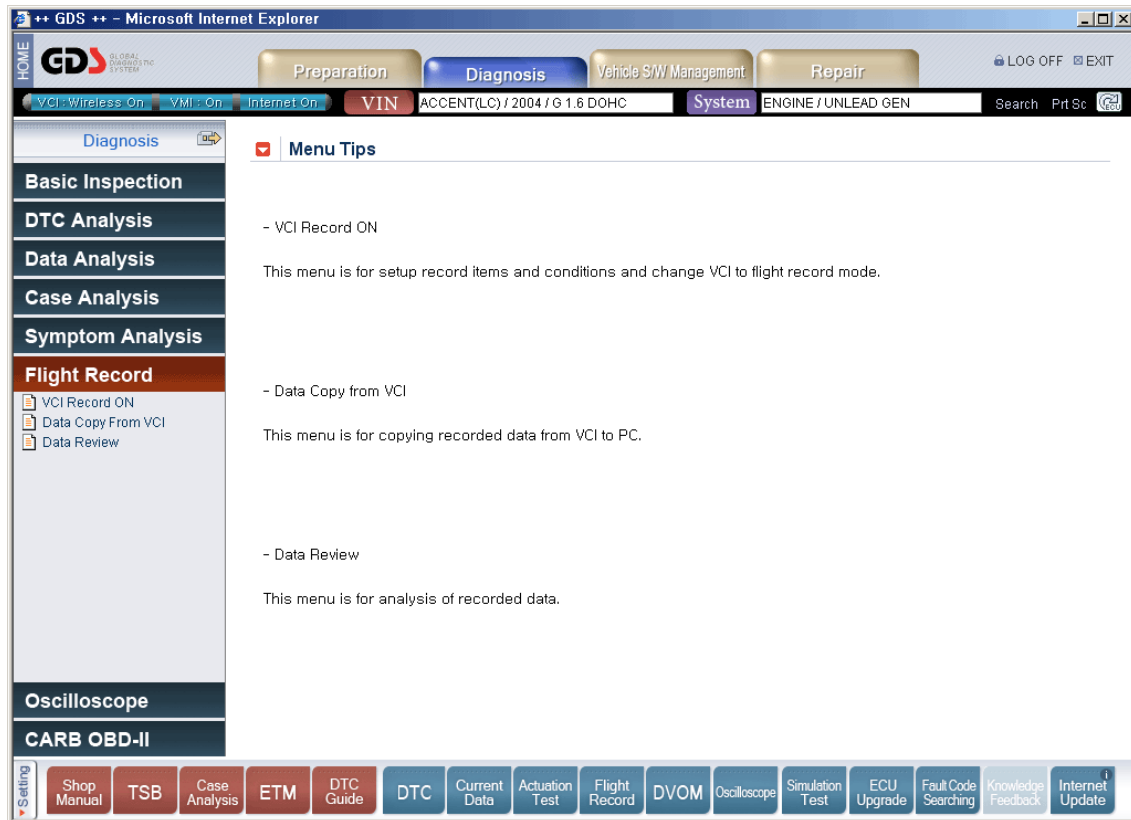
Figure 21. Flight Record Review Initial Page

Data Copy from VCI

To copy saved data from the VCI, select the "Data Copy from VCI" option from the left-hand side of the screen. VCI files will display on the left, and files on the PC will display on the right. Select the desired file, and click the "Start Copy" button to begin the data transfer. Upon completion, a window will appear to confirm the data transfer.

To erase data stored in the VCI, click the "Erase VCI Data" button."
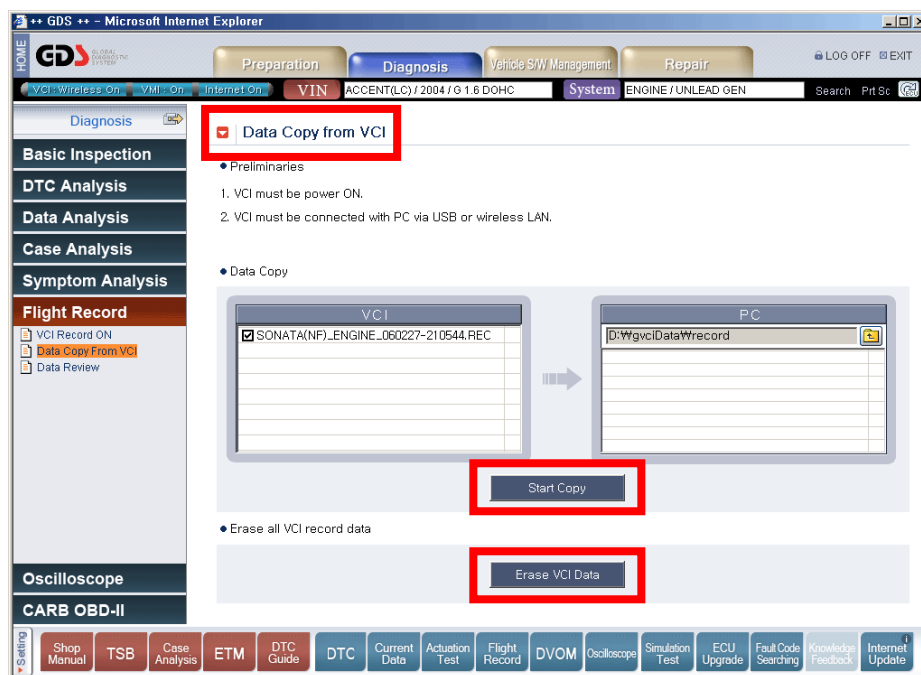
Figure 22. Data Copy from VCI
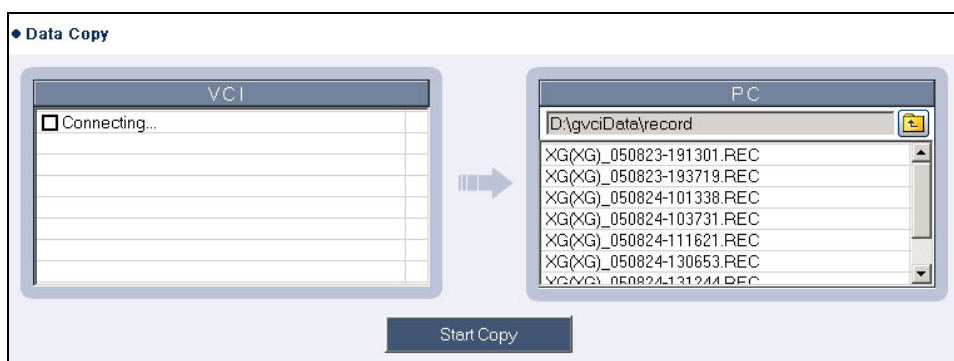
Figure 23. PC connecting to VCI
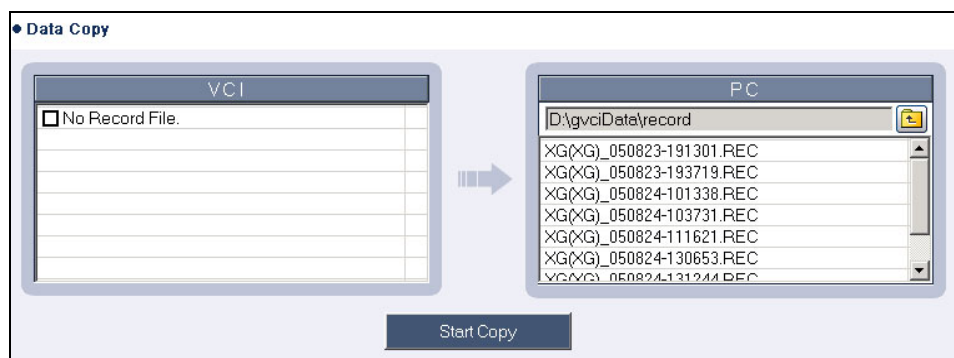
Figure 24. No Record File in VCI
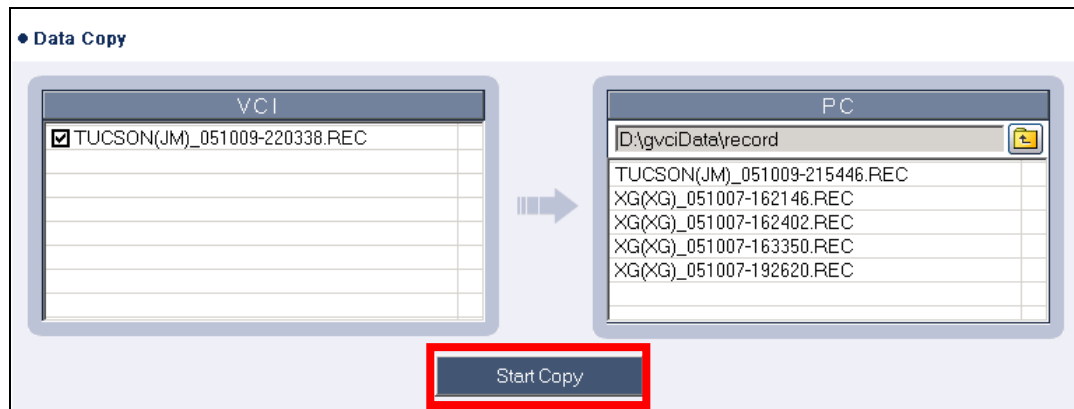
Figure 25. Copy the Record File from VCI to PC
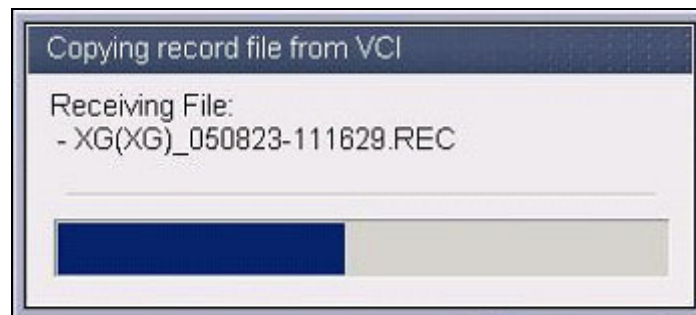
Figure 26. Copying Record File from VCI Progress window
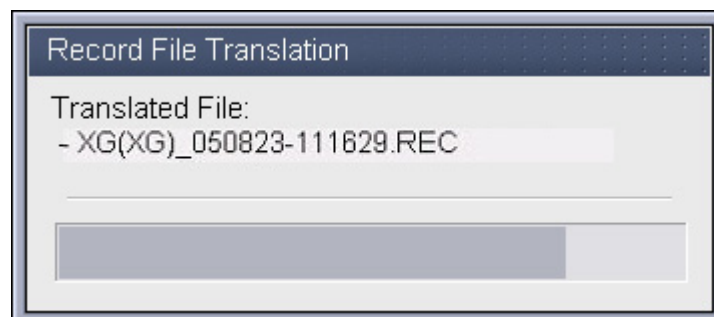
Figure 27. Record File Translation Progress
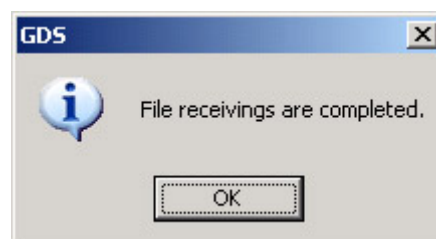
Figure 28. Complete the Data Copy from VCI
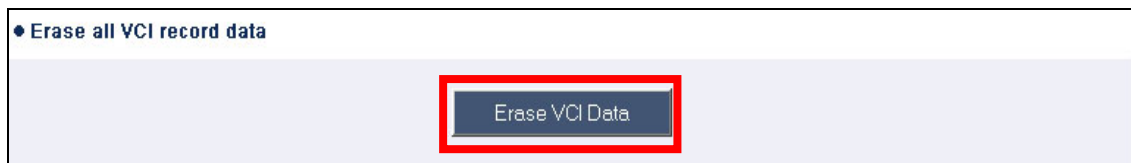
Figure 29. Erase VCI Data

"Erase VCI Data" button is used to deleting data in the VCI module.
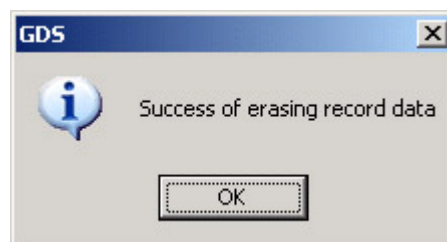
Figure 30. Erase VCI Data Complete

Data Review

This menu is for analysis of recorded data. Press 'Data Review' button to analyze new or previously saved data. With the 'Data Review' window opened, it will ask you to select a record file. Highlight the file to displayed and Open the file. Select the data on the right of the screen to display (Figure 28). Maximum number of items that can be displayed on the screen as a graph is 8.
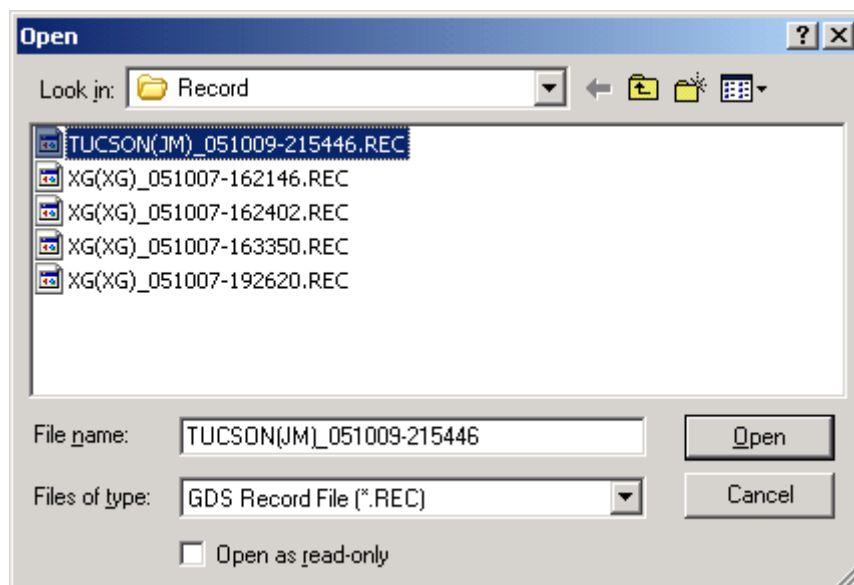
Figure 31. Data Open Window
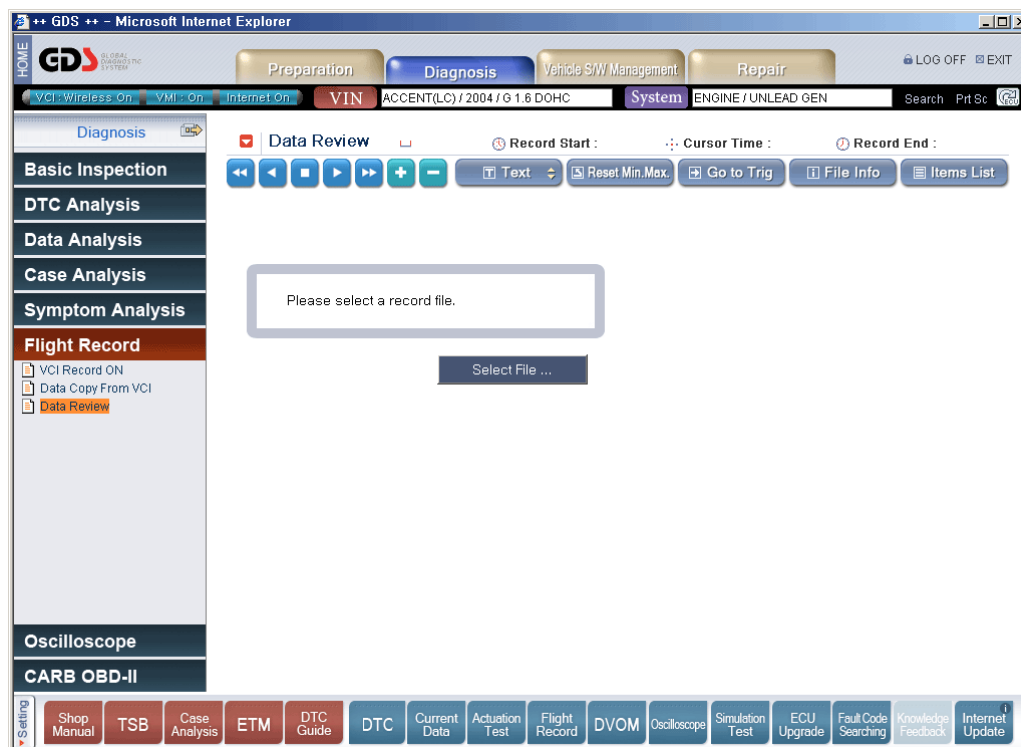
Figure 32. Data Review Initial Window
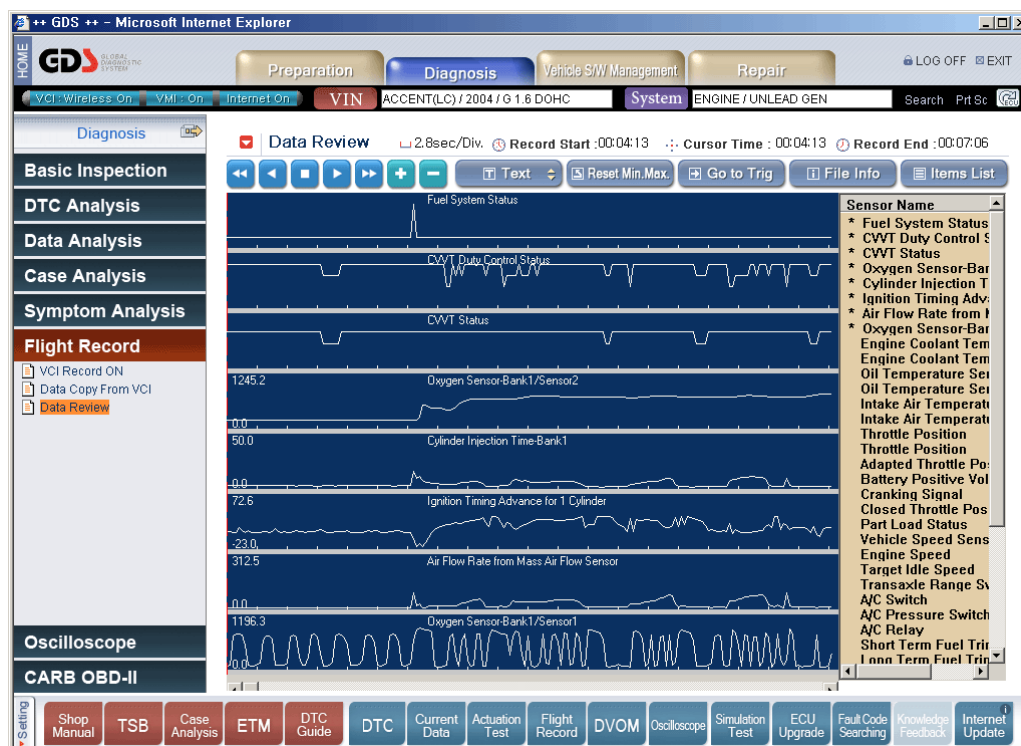
Figure 33. Data shown in graph (Items)
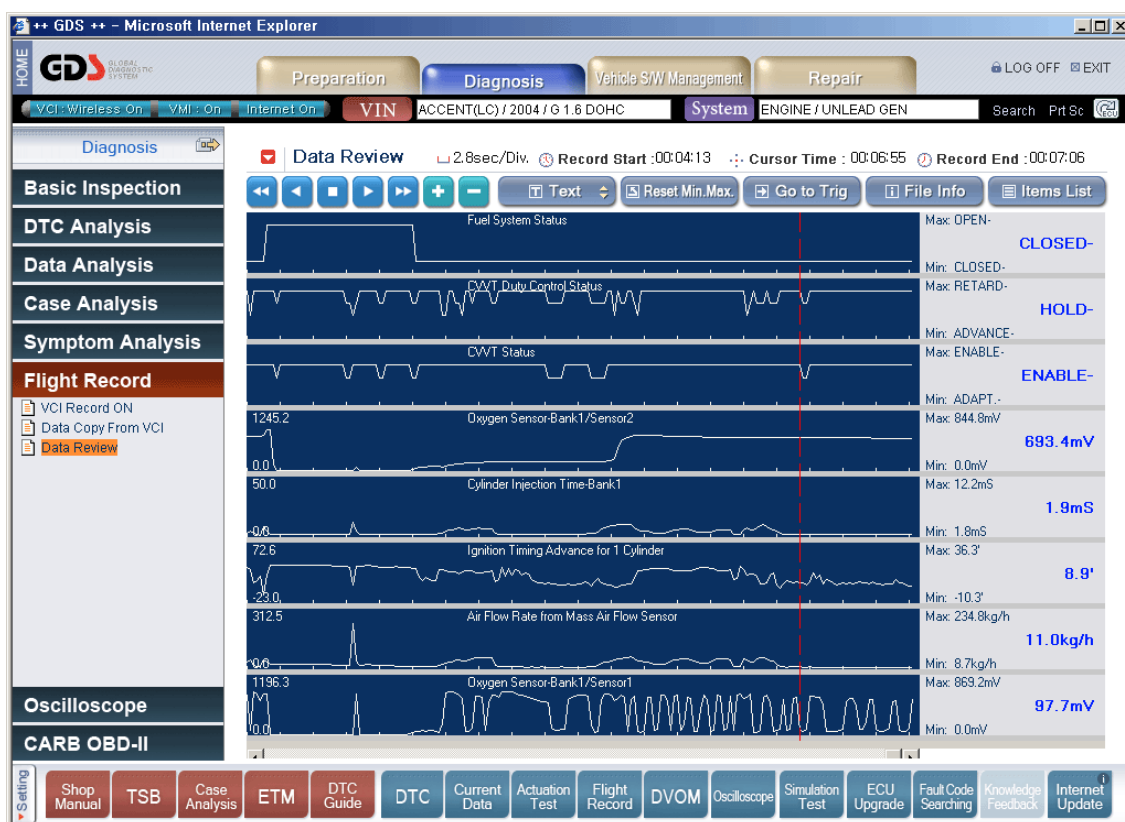
Figure 34. Data shown in graph (Value)
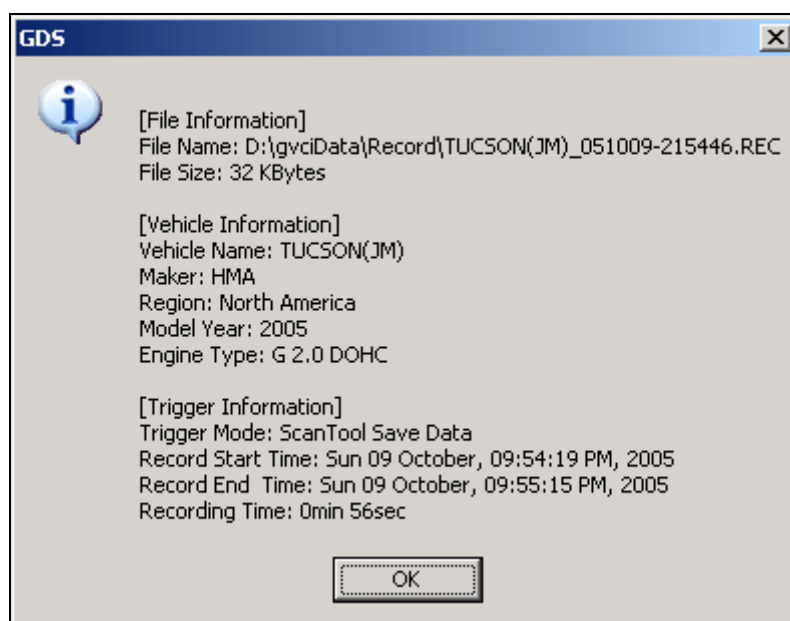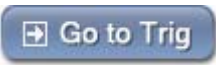
Figure 35. File Information Window

Icon	Description
Select File ...	Used for loading saved data
◀◀ ◀ ■ ▶ ▶▶	Used to move graph to the left or to the right
+ −	Use to change the graph time resolution
T Text ⬍	This button changes the display from Text to Graph mode.
☑ Graph ⬍	This button changes the display from Graph to Text mode.
⬛ Reset Min.Max.	Reset the minimum and maximum values for all selected items.
➡ Go to Trig	Move to the position that fault code appeared or shows when the trigger 'Enter' button was depressed. (Approx. 10 sec; before the end of the data record)
ⓘ File Info	Shows data information of the loaded record file.
☰ Items List	Shows item list of the data
⊔	Show the time per division.
🕓 Record Start	Shows the time that the recording is started
⋮ Cursor Time	Shows the trigger starting time
🕘 Record End	Shows the time that the recording is ended

<table>
<tr><td>GDS GLOBAL DIAGNOSTIC SYSTEM</td><td>**CARB OBD Ⅱ**</td><td>GIT Global Information Technology</td></tr>
</table>

GDS – Diagnosis	**Module: A–04-007 (p.01)**

CARB OBD Ⅱ mode is used to display generic vehicle powertrain diagnostic data. The vehicle communication protocol is automatically determined when CARB OBD II mode is selected.

Readiness Test

The type and result of the READINESS TESTS supported by more than one MODULE within the vehicle will be displayed. The number of DTCs present and the MIL status will also be displayed.

Figure 1. Readiness Test

Current Data

The CURRENT DATA MODE allows for sensor values and switch states to be displayed, based upon the concept that one item may be supported by several modules. Supporting module information is displayed in this mode.

Figure 2. Current Data

Freeze Frame Data

The FREEZE FRAME DATA displays the data values stored in the Engine Control Module at the point when the first conformed DTC is detected.

Figure 3. Freeze Frame Data

Diagnostic Trouble Code

At this level, DIAGNOSTIC TROUBLE CODES (DTC) are Displayed based upon the concept that several modules may support one DTC. Supporting module information is displayed in this mode.

Figure 4. Diagnostic Trouble Code

O2 Test Result

The results of the on board oxygen sensor monitoring test can be displayed in this mode. Note that only items related to the oxygen sensor will be displayed.
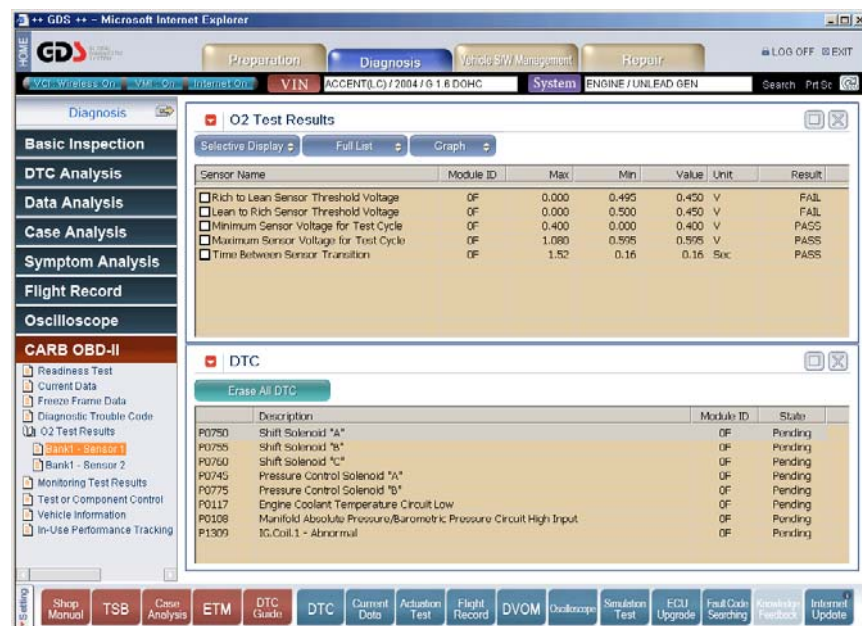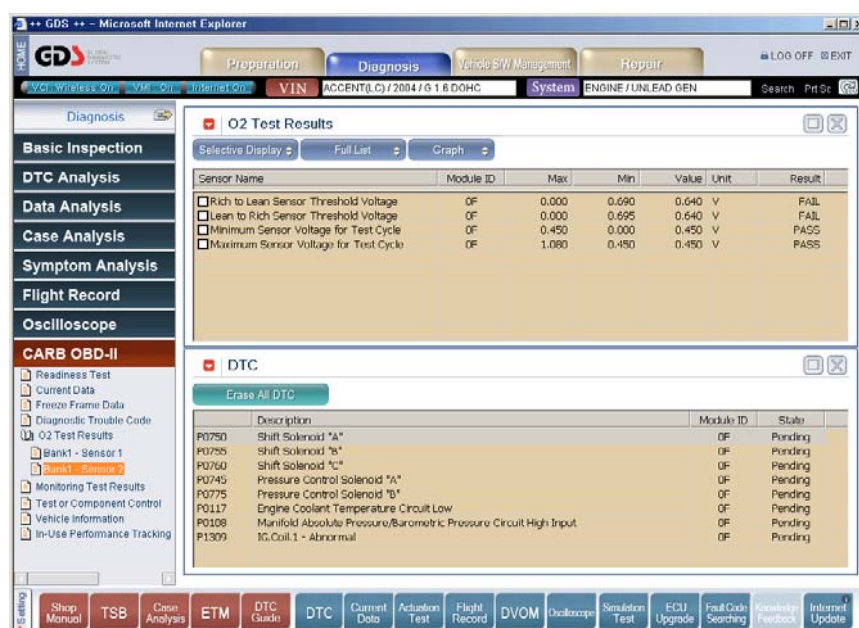

Figure 5. O2 Test Result (B1/S1)

Figure 6. O2 Test Result (B1/S2)

Monitoring Test Result

The results of on board monitoring tests conducted during normal driving are displayed this mode.

Figure 7. Monitoring Test Result

Test or Component Control

Figure 8. Test or Component Control
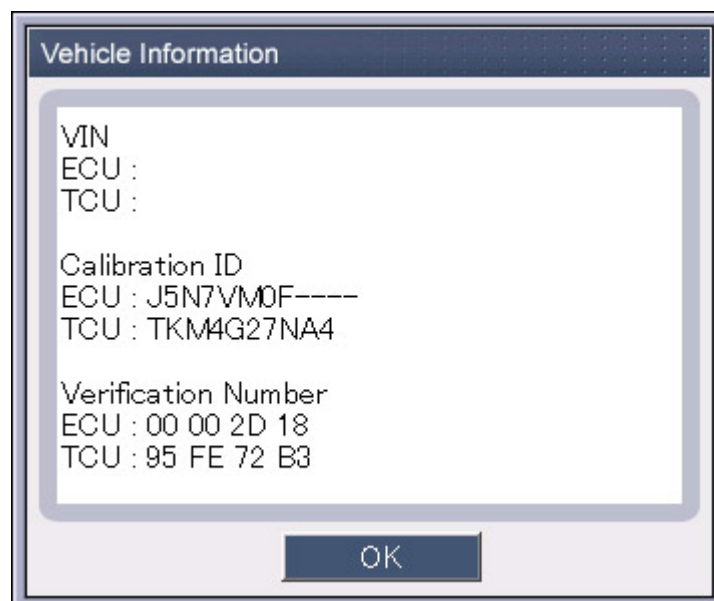
Vehicle Information

Figure 9. Vehicle Information

In-USE Performance Tracking

This data is used to support possible regulatory requirements for In-use Performance Tracking. Manufacturers are required to implement software algorithms that track in-use performance for each of the flowing component:

- Catalyst bank 1
- Catalyst bank 2
- Primary oxygen sensor bank 1
- Primary oxygen sensor bank 2
- Evaporative 0.020" leak detecting system
- EGR system
- Secondary air system

The numerator for each component or system shall track the number of time that all conditions necessary for a specific monitor to detect a malfunction have been encountered. The denominator for each component or system shall track the number of times that the vehicle has been operated in the specified conditions. These conditions are specified for each monitored component or system.

The ignition counter shall track the number of times that the engine has been started. All data items of the In-use Performance Tracking record have to be reported in the order as shown.
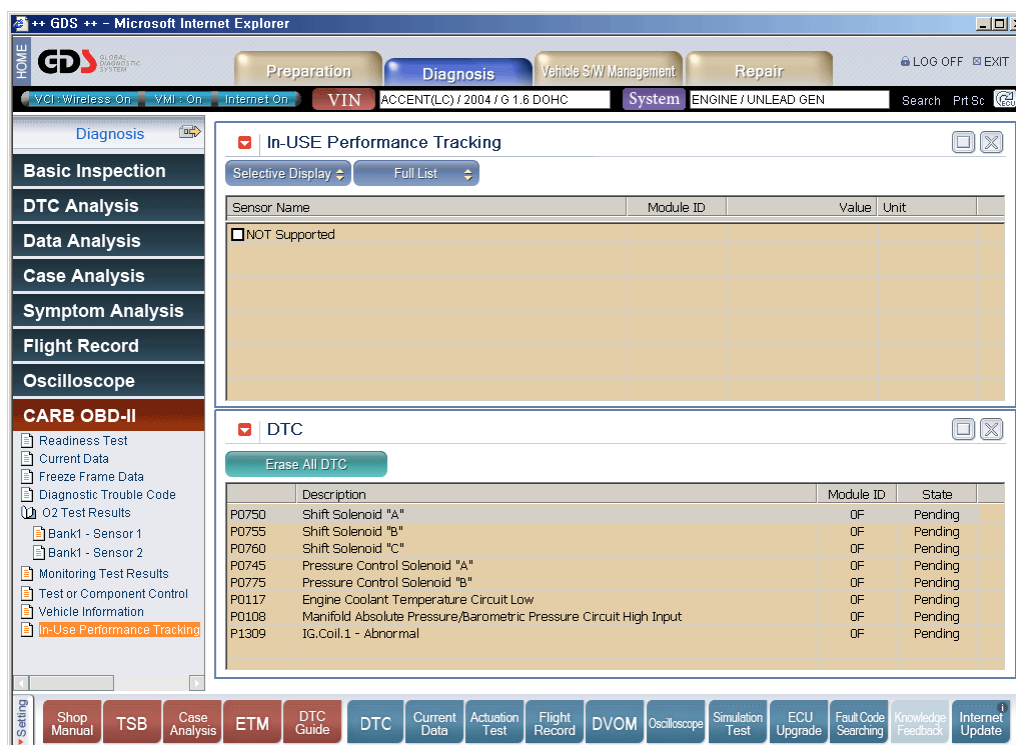
Figure 10. In-Use Performance Track

Actuation test

GDS - Diagnosis	**Module: A–04-008 (p.01)**

Selection of Actuation Test Item

The "Actuation Test" mode allows supported outputs to be activated by the user to verify proper ECU and component operation.
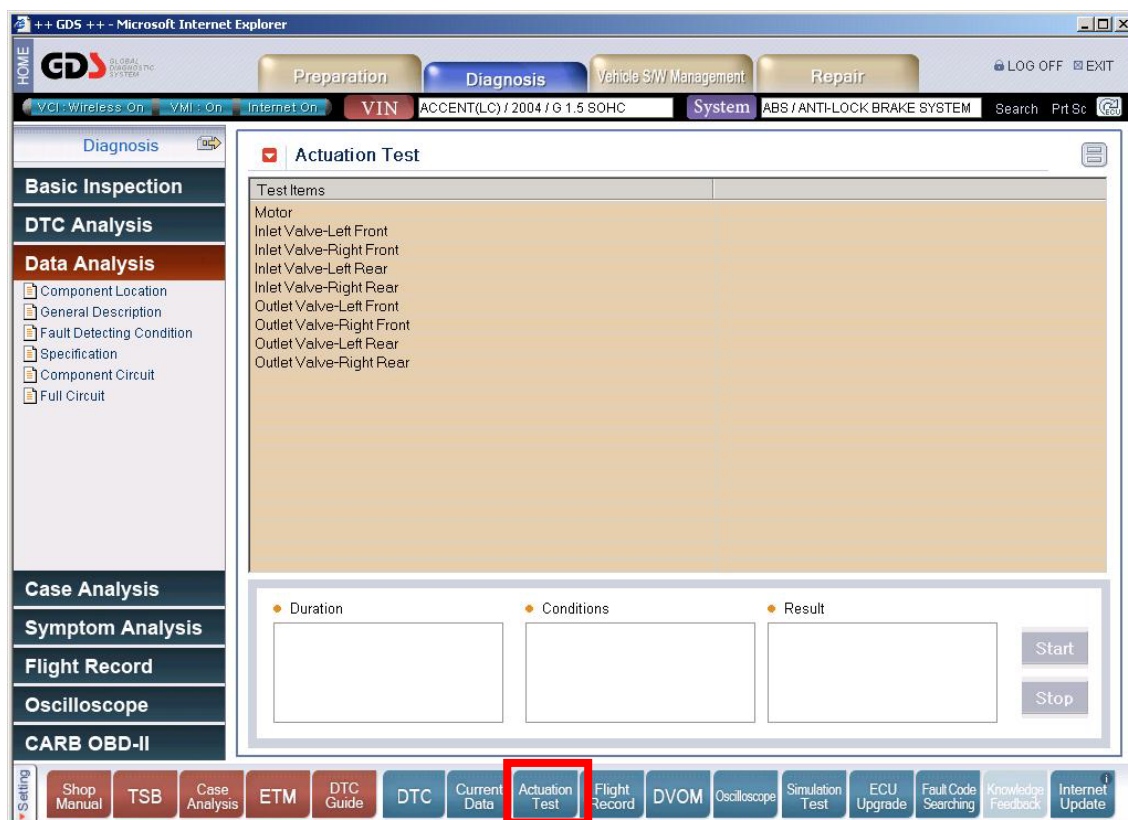

Figure 1. Selection of Test Item

Preparation of Actuation Test

Each supported actuator test will have specific test duration and ignition key conditions.

Click the "Start" button after selecting the desired test. Note that some tests will continue until the "Stop" button is clicked."

Results (variable based on ECU) may be viewed in the "Result" field, by audible or visible output, by viewing the appropriate data parameter, or by a combination of the previously listed methods.
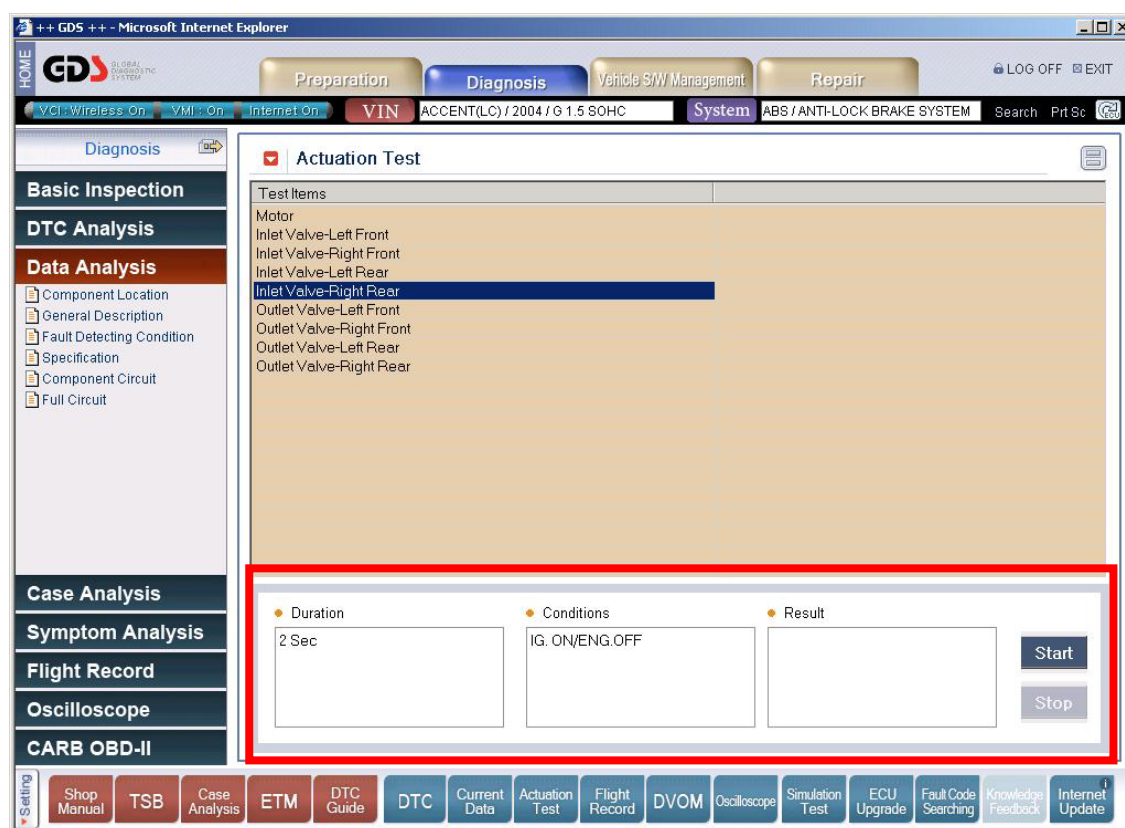

Figure 2. Operation of Actuation Test