

DG Diagnostics (OBDII) OBDII Diagnostic Tool



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IMPORTANT

To ensure your success with this product, it is essential that you read this document carefully before using the hardware.

Damage caused by misuse of the hardware is not covered under product warranty. When using this manual, please remember the following:

- This manual may be changed, in whole or in part, without notice.
- DG assumes no responsibility for any damage resulting from the use of this hardware or software.
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2 Safety First

It is essential that the user read this document carefully before using the hardware.

DG Diagnostics (DGD) is to be used by those trained in the troubleshooting and diagnostics of light-duty through heavy-duty vehicles and equipment. The user is assumed to have a very good understanding of the electronic systems contained on these and the potential hazards related to working in a shop-floor environment.

DG Technologies understands that there are numerous safety hazards that cannot be foreseen, so we recommend that the user read and follow all safety messages in this manual, on all of your shop equipment, from your vehicle manuals, as well as internal shop documents and operating procedures.



- Always block all wheels when testing.
- □ Use extreme caution when working around electricity. When diagnosing any vehicle, there is the risk of electric shock both from battery-level voltage, vehicle voltages, and from building voltage.
- □ Do not smoke or allow sparks or open flames near any part of the vehicle fueling system or vehicle batteries.
- Always work in an adequately ventilated area, and route vehicle exhaust outdoors.
- Do not use this product in an environment where fuel, fuel vapor, exhaust fumes, or other potentially hazardous liquids, solids, or gas/vapors could collect and/or possibly ignite, such as in an unventilated area or other confined space, including below-ground areas.

2.1.1 DG Diagnostics (OBDII) and DG Diagnostics (MD/HD) Overview

The DG Diagnostic software suite communicates with DG's RP1210 and J2534 adapters to gather information about your vehicles regardless of whether they are light, medium or heavy duty. The software is also capable of doing non-proprietary diagnostics of vehicles.

The light and medium-duty world is different in the protocols and standard used to write software than the medium and heavy-duty world. For the most part (other than the new Volvo platform), it is based on the diagnostics connector. When you click DG Diagnostics on the desktop or from the start menu, a screen will be displayed asking the user what version of DG Diagnostics to run.

The shortcut to launch DG Diagnostics is located in the start menu where your tool installed or on your desktop in most instances.

2.2 DG Diagnostics Launcher

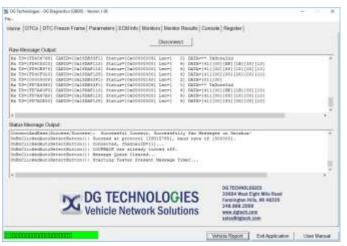
The *DG Diagnostics Launcher* allows user to select which type of vehicle they will be connecting to. This manual contains details about the OBDII application that is launched when the bottom on the right is selected.

- ☐ Click on the MD/HD Truck button if you want to use the J1708/J1587 and J1939 diagnostic application. Traditionally, this has been the 6 or 9-pin Deutsch connector.
- ☐ Click on the OBDII Car button if you want to use OBDII diagnostics. Traditionally, this will be the OBDII connector.
- ☐ You can use either program for the 2013 (or newer) Volvo chassis with Volvo engine.



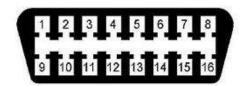
2.3 DG Diagnostics OBDII vs MD/HD

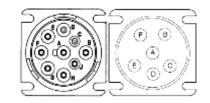
DG Diagnostics (OBDII)



DG Diagnostics (MD/HD)







- DG Diagnostics (OBDII) is for use on Light-Duty (Automotive) and Medium-Duty vehicles and equipment using any OBDII protocol and the OBDII connector.
- This software uses the SAE J2534 API.

response.

- DG Diagnostics (MD/HD) is for use on Medium-Duty or Heavy-Duty vehicles and equipment using the J1708/J1587 and J1939 Protocols and the Deutsch 6 or 9-pin connectors.
- It also works on the Volvo platform with the OBDII connector (see below).
- This software uses the TMC RP1210 API.

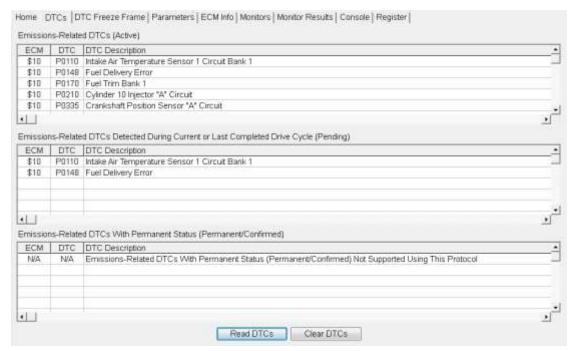
3 DG Diagnostics (OBDII) Program Overview

☐ Implementation of all J1979 OBDII-Defined Diagnostic Modes.

DG Diagnostics (OBDII) is a highly useful, general purpose OBDII (SAE J1979) diagnostics program provided free-of-charge to DG's J2534 product customers. Some of the high-level features are:

<u> </u>	Implementation of all J1979 OBDII-Defined Parameters (PIDs). Implementation of all SAE J2012-Defined Diagnostic Trouble Codes at the Time of this Writing.
The pi	rogram can:
	Display Diagnostic Trouble Codes (DTCs/Faults), including Active, Pending, and Permanent.
	Display Freeze Frame parameters reported at the time of the fault causing Freeze Frame data to be stored.
	Display all OBDII parameters that a vehicle supports.
	Display ECM information such as VIN and Calibration ID (CALID).
	Display Emissions Monitors status (since DTC's cleared, this driving cycle) along with engine OBD compliance.
	Display results for OBD monitoring tests of components that are continuously monitored (e.g. misfire monitoring for gasoline vehicles) and non-continuously monitored (e.g. catalyst system).

☐ Allows a user to define and send a specific request message, and then displays the resulting vehicle



DG Diagnostics (OBDII) is a very good initial triage tool!

<u>NOTE</u>: Numbers with the prefix "\$" or "0x" are used to define numbers using the hexadecimal numbering system (base 16). ECMs will always be represented in hexadecimal notation, however there is an option to display other numbers used in the program in decimal or hexadecimal.

4 DG Devices and their Supported Protocols

4.1 Introduction to OBDII Vehicle Protocols

- ISO 15765 (CAN-based)
 - This protocol was mandated in all automobiles starting in 2008.
 - There are two options, 11-bit identifiers and 29-bit identifiers. DGD (OBDII) supports both modes.
- ☐ J1850 VPW (Variable Pulse Width)
 - o This protocol is very common on General Motors (GM) vehicles prior to 2008.
- ☐ J1850 PWM (Pulse Width Modulation)
 - o This protocol is very common on Ford vehicles prior to 2005.
- ☐ ISO 9141 and ISO 14230
 - These protocols are typically found on pre-2008 European vehicles.

4.2 OBDII Protocols Supported by DG Tools

The table below details what DG tools support what protocols. An 'X' in the column indicates that the protocol in that column is supported.

	ISO 15765 (CAN-based)	J1850 VPW (Variable Pulse Width)	ISO 9141 and ISO 14230	J1850 PWM (Pulse Width Modulation)

VSI NxGen	Х	Х	Х	Х
DPA XL	Х	Х	Х	X
DPA 5 Pro	Х	Х	Х	
DPA 5 Dual-CAN	Х	Х	X	
DG d-briDGe	Х	Х	X	
Netbridge Quad CAN	Х			
VSI-2534	Х	Х	Х	Х
Beacon	Х			
All Gryphon Devices	Х	Х	Х	Х
(Gryphon, G2, S3, S4)	*Depends on	*Depends on	*Depends on	*Depends on
	Configuration	Configuration	Configuration	Configuration

<u>NOTE:</u> The Gryphon hardware can be configured many different ways. The protocols supported by can vary from device to device. If you need help determining what your Gryphon device supports, please refer to documentation included with the hardware or contact DG technical support.

5 Features and OBDII Modes

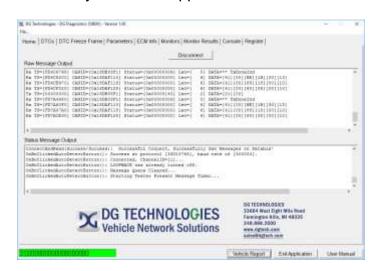
- ☐ Read and Display Diagnostic Trouble Codes (DTCs) in Numeric and Text (SAE J2012) Form.
 - o Active Emissions-Related DTCs Mode 3.
 - o Pending Emissions-Related DTCs Detected During Last Or Current Drive Cycle Mode 7.
 - Pending Emissions-Related DTCs With A Permanent Status Mode 10
 - o Request ECMs to Clear DTCs and Monitors Mode 4.
- ☐ Display Freeze Frame Data Mode 2
 - Display All Parameters Recorded At The Time Of The Fault That Caused Freeze Frame To Be Stored.
- ☐ Display All Parameters That The Vehicle Supports In Both English and Metric Values Mode 1.
- Display ECM Information Such As VIN and Calibration ID (CALID) Mode 9.
- ☐ Display The Value Of Monitors That Have Run and The Status Of The Malfunction Indicator Light (MIL).
 - Monitor Status Since DTCs Cleared Mode 1 PID 1.
 - Monitor Status This Driving Cycle Mode 1 PID 65.
 - OBD Requirements Vehicle Certified To Mode 1 PID 28.
 - OBD Requirements Vehicle Certified To Mode 1 PID 95.
- Send Any Generic OBDII Command Using The Console Screen All Modes.
 - This Covers Sending And Receiving Raw Message Data.
- Create A Vehicle Report In HTML Based On All Information That Has Been Discovered.

DGD (OBDII) supports all OBDII Modes from 1..10 (\$01..\$0A) with the exception of Mode 5 (O2 Sensor Test Results). Most vehicle OEMs have implemented Mode 5 results using Mode 6; which is supported in the *Monitor Results* tab.

<u>NOTE</u>: Mode 5 has been implemented and tested with fabricated data. However, DG has not found a vehicle or OBDII simulator supporting this Mode, therefore the **O2 Sensor** tab is not visible. If you have a vehicle known to support Mode 5, please contact DG so that we can enable that tab and provide you with a beta copy of the DGD (OBDII) software.

6 DG Diagnostics (OBDII) Program Help - Home Screen

When the DGD OBDII program is launched, the program defaults to the *Home* tab. This is where you initiate and terminate your diagnostic session. The *Vehicle Report, Exit Application*, and *User Manual* buttons are always visible. Note that the last adapter that you connected with will be saved, and DGD OBDII will default to this adapter the next time you run the application.



6.1 Connect / Disconnect Button

If this is the first time you have connected, you will be directed to the <u>Configuration Parameters</u> dialog to set up (at a minimum) the diagnostic adapter to be used. The Configuration Parameters dialog is covered in the next chapter. Otherwise, the program will attempt to connect using the last adapter selected and identify the supported OBDII vehicle protocol and request all supported OBDII parameters (which may take a minute or more). After this discovery, the user can begin using other tabs. Once you are connected this button changes to a **Disconnect** button.

6.2 Raw Message Output and Status Message Output Fields

The Raw Message Output field shows messages sent to/received from the vehicle. This message data is in raw hexadecimal form and is mostly for engineering analysis. The Status Message Output field shows status type information transpiring within the program. This is also mostly for engineering analysis.

6.3 Vehicle Report Button

This button brings up a dialog box that will allow the user to enter the name of the HTML file for a vehicle report of all parameters discovered. The report is covered in a later chapter.

6.4 Exit Application Button

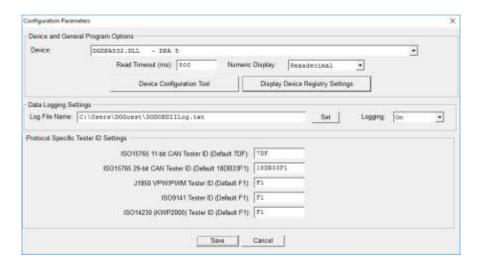
This button disconnects (if connected) and exits the application.

6.5 User Manual Button

This button brings up this help file/user manual (this document).

7 Configuration Parameters Dialog

This dialog box allows users to configure various aspects of the program. At a minimum, the user must select the *Device*, which is the Vehicle Diagnostic Adapter (VDA) to be used. All other parameters should be left to their default values unless you want to specify a specific data logging file, want to turn off/on data logging (on by default), or want to change the display of numbers between the decimal system or hexadecimal system.



7.1 Device and General Program Settings

This combination box allows you to select the VDA to use as your interface device. Only Dearborn Group, Inc. devices from the following list will appear; and only if that device has been installed.

- DGVSINXGEN32.DLL VSI NxGen
- DGDPAXL32.DLL DPA XL
- DGDPA532.DLL DPA 5 Bluetooth or DPA 5 Pro
- DGVSI32.DLL VSI 2534
- NBRIDGE.DLL Netbridge
- DBRIDGE.DLL d-briDGe
- J2534B32.DLL Beacon
- J2534G32.DLL Gryphon, G2, S3, S4

7.2 Read Timeout (ms)

This is the read timeout for reading messages. The timeout value controls how long the application will wait for a response message to a request for data. The default wait time (500ms) is displayed. A lower value will allow the application to discover ECMs and monitor parameters faster, however if set too low, the application will begin to behave erratically, and timeouts will occur. In general, if the application generates error messages, increase the value. A default of 500 is sufficient.

7.3 Numeric Display

Most of the OBDII (SAE J1979) documentation shows numbers in the hexadecimal number notation (mostly for engineering purposes). This field allows engineers to set it to hexadecimal (default) and allows technicians to set it to decimal if they so desire. ECMs will always be displayed in hexadecimal form.

7.4 Data Logging Settings

7.4.1 Log File Name and Set Button

Pressing the Set button will allow you to select a file where raw message data from the program will be written. The file is a readable text file that can be opened with Notepad. This is mostly for engineering analysis.

7.4.2 Logging On / Off

This combination box allows the user to turn logging on or off. It is on by default.

7.5 Protocol Specific Tester ID Settings

The user should refrain from changing these values as they may affect the program adversely. These values are for engineering purposes only.

7.5.1 **ISO15765 11-bit CAN Tester ID (Default 7DF)**

This edit box allows setting the Tester ID to a value other than the default.

7.5.2 ISO15765 29-bit CAN Tester ID (Default 18DB33F1)

This edit box allows setting the Tester ID to a value other than the default.

7.5.3 J1850 VPW/PWM Tester ID (Default F1)

This edit box allows setting the Tester Source Address to a value other than the default.

7.5.4 **ISO9141 Tester ID (Default F1)**

This edit box allows setting the Tester Source Address to a value other than the default.

7.5.5 **ISO14230 (KWP2000) Tester ID (Default F1)**

This edit box allows setting the Tester Source Address to a value other than the default.

7.6 Buttons

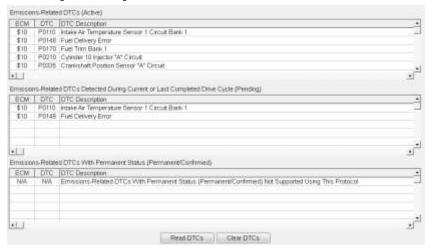
7.6.1 **Save**

Pressing this button saves current settings. The user can now connect to the device selected.

7.6.2 **Cancel**

Exit dialog box and do not save current settings. The user must select a device and press the *Save* button before a connection can be made.

8 DG Diagnostics (OBDII) - DTCs Screen



8.1 DTC Grids

There are three types of OBDII fault codes, all of them are Emissions Related. There are Active DTCs, Pending DTCs, and Permanent/Confirmed DTCs.

There are 4 types of faults defined in the SAE J2012 specification, they are:

- P Powertrain
- C Chassis
- B Body Control
- U Network

NOTE: Permanent DTCs are not supported by the J1850, ISO 9141, or the ISO 14230 protocols since they are the older protocols.

8.2 Read DTCs Button

Pressing this button will request DTCs from all ECMs and display them.

8.3 Clear DTCs Button

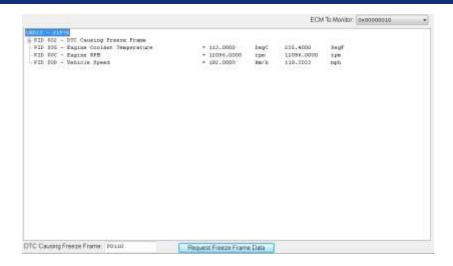
Pressing this button will request that all DTCs and Monitor information be cleared from all OBD controllers.

Clearing faults is a request some ECMs do not honor.

If DTCs or Monitors are not cleared, this is not a defect in the program.

9 DG Diagnostics (OBDII) Program Help – DTC Freeze Frame Screen

Some ECMs store Freeze Frame data when a fault code occurs. This data usually gives a technician some insight into what was going on within the vehicle at the time a DTC was stored.



9.1 ECM To Monitor

Different ECMs can store Freeze Frame data, so select the ECM to request Freeze Frame data from. By default the primary OBD device will be selected.

9.2 Display Window

Depending on what Freeze Frame PIDs are supported by the selected ECM, the information will be displayed in a tree format. Simple parameters will be displayed on the same line and do not have the plus sign [+]. The first column will be the value in metric units and the second value will be in English units.

Complex (binary-type) parameters have the plus sign [+] next to them. Press the plus sign to view all sub-parameters of the complex parameter. The first column will be the value in metric units and the second value will be in English units.

9.3 Request Freeze Frame Data Button

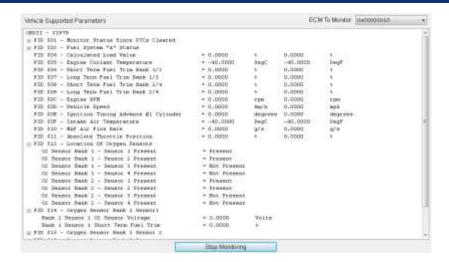
Pressing this button will request Freeze Frame DTCs and the DTC Causing Freeze Frame from the ECM selected and display the information returned. A message box will appear stating the requests have been completed.

9.4 DTC Causing Freeze Frame

This is the DTC that caused the ECM to store the Freeze Frame data.

10 DG Diagnostics (OBDII) Program Help - Parameters Screen

The parameters screen will allow a technician to monitor vehicle parameters that the OBD devices support.



10.1 ECM To Monitor Combination Box

Select the ECM to request data from. By default, the OBD device will be selected.

10.2 Display Window

Depending on what PIDs are supported by the selected ECM, the information will be displayed in a tree format. Simple parameters will be displayed on the same line and do not have the plus sign [+]. The first column will be the value in metric units and the second value will be in English units.

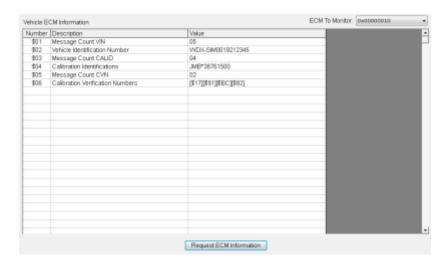
Complex (binary-type) parameters have the plus sign [+] next to them. Press the plus sign to view all sub-parameters of the complex parameter. The first column will be the value in metric units and the second value will be in English units.

10.3 Start Monitoring / Stop Monitoring Button

Pressing this button starts requesting the Parameter Identifiers (PIDs) that the particular ECM supports. You must stop monitoring before you can use other buttons on other screens (those buttons will appear grayed out).

11 DG Diagnostics (OBDII) Program Help - ECM Info Screen

This screen shows various aspects about the vehicle, such as Vehicle Identification Number (VIN) as well as the Calibration ID (CALID) and Calibration Verification Numbers (CVNs).



11.1 ECM To Monitor Combination Box

Select the ECM to request data from. By default, the OBD device will be selected.

11.2 Display Grid

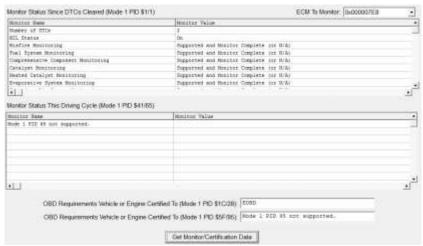
Depending on what Info Type values are supported, the information will be displayed in the grid in both English and Metric values. Typical values are for VIN, Calibration ID (CALID), and the Calibration Verification Numbers (CVNs). If the character returned in an Info Type is not a printable character, a '.' will be shown. Some controllers also use different 'packing' characters, so you may see a '?' or other data which may not look like it belongs.

11.3 Request ECM Information Button

Pressing this button requests Info Types from the selected ECM.

12 DG Diagnostics (OBDII) Program Help - Monitors Screen

This screen shows which OBD Monitors are supported and their status as well as which OBD requirements a vehicle is certified to.



12.1 ECM to Monitor Combination Box

Select the ECM to request data from. By default, the OBD device will be selected.

12.2 Display Grids and Text Boxes

The top grid shows Monitors since the last DTC reset and the bottom are the monitors that have ran during the current drive cycle (Mode 1 PID \$1/1 and Mode 1 PID \$41/65). All monitor information will be displayed as well as the two possibilities for what OBD requirements the vehicle or engine was certified to (Mode 1 PID \$1C/28 or Mode 1 PID \$5F/95).

12.3 Get Monitor/Certification Data Button

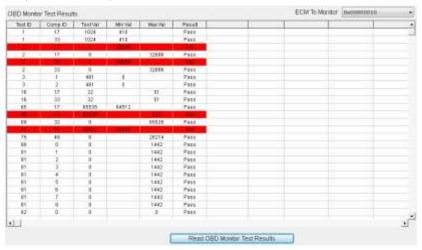
Pressing this button requests the various parameters from the selected ECM.

13 DG Diagnostics (OBDII) Program Help - Monitor Results Screen

Depending on the protocol, the Monitor Results screen will take on two appearances. The J1850, ISO 9141, and ISO14230 format carries less data (older protocols) than CAN/ISO 15765 (mandated in 2008). The display of results may vary by OEM and can typically be found by searching the Internet for the vehicle year/type along with the TestID and Comp ID. The first figure shows several failing Monitor Test Results.

- Test ID descriptions can be found in J1979 Appendix C
- Monitor ID descriptions can be found in J1979 Appendix D

13.1 Screen for J1850, ISO 9141, ISO 14230



13.1.1 ECM To Monitor Combination Box

Select the ECM to request data from. By default, the OBD device will be selected.

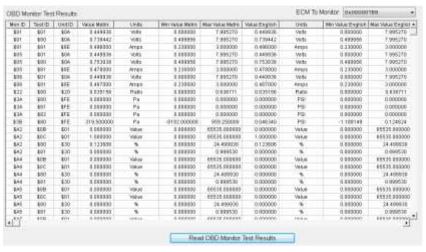
13.1.2 Display Grids and Text Boxes

Each Test ID (TID) and Component ID (CID) monitor will be displayed, and if that monitor has failed, it will be outlined in red.

13.1.3 Read OBD Monitor Test Results Button

Pressing this button requests the various monitor test results from the selected ECM.

13.2 Screen for ISO 15765



13.2.1 ECM To Monitor Combination Box

Select the ECM to request data from. By default, the OBD device will be selected.

13.2.2 Display Grids and Text Boxes

Each Monitor ID (MID), Test ID (TID) and Unit ID (UID) monitor will be displayed, and if that monitor has failed, it will be outlined in red.

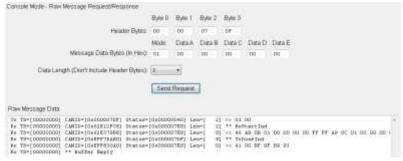
13.2.3 Read OBD Monitor Test Results Button

Pressing this button requests the various monitor test results from the selected ECM.

14 DG Diagnostics (OBDII) Program Help - Console Screen

The purpose of the Console screen is to allow control or monitor the operation of an on-board system that may (i.e. Mode 8) or may not be part of the OBDII specification. It can also be used just to send generic messages to the vehicle system. This is more of an engineering-related screen, but a technician may be asked to send a specific message (or message sequence) to a specific component on a vehicle.

This screen is mostly for engineers or those who have been asked by an OEM or DG to send a specific message and get the response to that message.



ISO 15765 11-bit Example



J1850 Example

14.1 Header Bytes

This is protocol dependent. There are 4 header bytes for a CAN/ISO 15765-based vehicle and 3 header bytes for a J1850, ISO 9141, or ISO 14230 vehicle. The form will be populated with the currently connected protocol settings by default. These will always be entered in hexadecimal form.

- The header bytes in Figure 12.1 of "00 00 07 DF" show the generic OBDII tester 11-bit CANID of \$7DF.
- The header bytes in Figure 12.2 of "61 6A F1" show the OBDII Target Address of \$6A, a Tester Address of \$F1 and a Priority/Type byte of \$61 (J1850PWM). For J1850VPW, the Priority/Type byte would be \$68.

For more information on header bytes and data bytes, please see the SAE J1979 document.

14.2 Message Data Bytes

These are the data bytes necessary to accomplish the desired test or to request action. Both of the above examples show sending "01 00" which is J1979 Mode 1 PID 00 meaning "Request PIDs Supported".

14.3 Message Length

This is the length of the data bytes needed. The above examples showed a data length of 2 (Mode 1, PID 00).

15 DG Diagnostics (OBDII) Program Help - Register Screen

If you like DG Diagnostics (OBDII), take a minute to register the	program.
We will email you with information regarding new versions of driv	ivers, DGD, and you will receive the DG Networker e-newsletter.
DG does not sell or give your information to any third parties. Yo	ou will not receive any unsolicited emails.
Registration fields	
First name:	Last name
Email address:	
Company:	
☐ I would like to beta	ta test future versions of DG Diagnostics (OBOII)
	Submit
	11 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -

DG Technologies has placed a lot of effort into providing you with a high-quality, generic diagnostics utility that we provide **free-of-charge**. We appreciate and value your business and we hope that you will take a minute to register the DG Diagnostics (OBDII) product.

If you take the time to register, we will e-mail you with updates to J2534 drivers or to OBDII, as well as subscribe you to our DG Networker e-newsletter. If you select the "I would like to beta test future versions of DG Diagnostics (OBDII)" radio button, we will also e-mail you with beta versions of OBDII so that you can provide us with feedback and potential bug reports. Our beta testers have provided great feedback that culminated in the many changes and enhancements that were added to our heavy-duty DG Diagnostics program over the years.

Your personal information will not be shared in any way with any third party outside of DG Technologies. We value your privacy, as we value our own. We will not spam you with unsolicited email other than the occasional periodic updates or the DG Networker newsletter. You can expect to receive one or two e-mails per quarter.

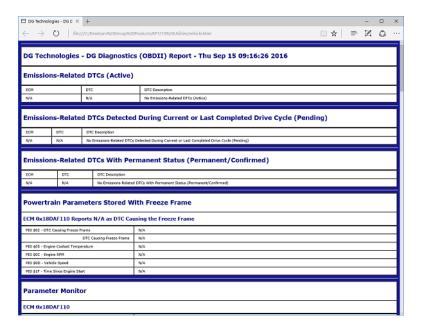
We would like to know who our users are, and we would like to have your comments on what we can do to make DG Diagnostics (OBDII) and our J2534 products better for you. Please feel free to e-mail us with suggestions to techsupp@dgtech.com and we will look at your request for a potential future version of the product.

Just a quick note asking you to be aware that DG does not have access to OEM proprietary data.

16 DG Diagnostics (OBDII) Program Help - Vehicle Report

To generate a report on a vehicle you must first connect and then go to each screen you want included in the report and request data for that screen (pressing the *request* button for that screen). After you have discovered the data, press the *Vehicle Report* button. You will be prompted to save the report as an HTML file that can later be printed, e-mailed, stored, or programmatically parsed into some type of database.

This report will look something like the following:



17 The File Menu and Associated Entries

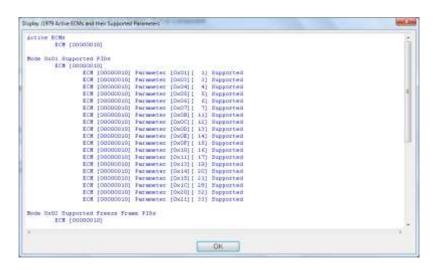
The file menu has two options. The first option is program configuration (see previous chapter) and the second is to display which ECMs are speaking with DGD (OBDII) and what modes/parameters each ECM supports.

17.1 Configuration

This menu entry launches the dialog used to configure DGD OBDII. The tool DGD OBDII will use to communicate with the vehicle is selected here as well as various timing parameters. To learn more about the configuration window please reference the chapter titled <u>Configuration Parameters</u> <u>Dialog</u>.

17.2 Display ECMs and Supported Parameters

This will display a list of all ECMs that responded to Mode 1, 2, 5, 6, 8, 9 requests for supported information. This information defines what parameters are supported by each ECM. Each ECM will support a different subset of vehicle parameters. If OBDII does not display a particular parameter, it is because that ECM reported that the parameter was not supported and that parameter will not be requested. This is an advanced feature used by those familiar with various network protocols.



18 Warranty Information

This program is provided AS IS and is free-of-charge for DG's J2534 product owners. It was intended to be a value-added feature to enhance the value of DG's J2534 product line.

DG Technologies disclaims all warranties, either expresses or implied, including any implied warranty of merchantability or fitness for any particular purpose. DG Technologies shall have no liability to anyone for incidental or consequential damages for merchandise which is provided AS IS.

DG Technologies makes no warranty as to the performance of this product. DG Technologies has placed this program through extensive testing, however as with any software, there could be deficiencies. Therefore, we cannot guarantee that any parameters displayed are accurate.

We hope that you enjoy this tool and find it of value. If you find deficiencies, or have requests for the addition of non-OEM-proprietary functionality, please do not hesitate to contact us at:

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