

## HD Data Logger User Manual



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This document describes the DG HD Data Logger. The HD Data Logger collects digital message data from a vehicle network for various types of analysis, such as vehicle performance, cost efficiency, problem diagnosis or network development work.

The DG HD Data Logger provides a complete picture of what is happening in the vehicle for analysis or diagnosis of the user's specific concerns.

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The accompanying software, provided for use with the DG HD Data Logger, is also copyrighted. Permission is granted to copy this software for back-up purposes only.

## **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.
- Specifications presented herein are provided for illustration purposes only and may not accurately represent the latest revisions of hardware, software or cabling.
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<b>Introduction.....</b>	<b>5</b>
<b>Data Logger Overview .....</b>	<b>7</b>
Power .....	7
Hardware Interfaces .....	7
Trigger Modes .....	7
Operational Sequence.....	7
Start Logging Conditions .....	9
Trigger Mode:.....	9
Manual Trigger Mode .....	9
Stop Logging Triggers .....	9
Automatic Mode .....	9
Manual Mode.....	9
Data Logging.....	10
Log Data File:.....	10
Log Data File Name: .....	10
Start [StartDate]-[StartTime]_End [EndDate]-[EndTime] .....	10
<b>Set-Up – Loading Instructions .....</b>	<b>11</b>
<b>Data Logger Operation .....</b>	<b>12</b>
USB Thumb Drive .....	12
User Interface .....	12
Display.....	12
Data Logger Settings .....	13
Edit the Configuration File on a PC - INI File .....	14
USB Thumb Drive Operation.....	15
For Data Logger Operation with a USB Thumb Drive .....	16
For Data Logger Operation Without a USB Thumb Drive .....	16
The Display .....	16
After Data Logging is Completed .....	16
Configuration parameters in INI file .....	17
Optional HD DL Kit .....	18
Beacon Manual .....	18

<b>Technical Support and Return Merchandise Authorization .....</b>	<b>19</b>
Return Merchandise Authorization (RMA).....	20
<b>Appendix A. Warranty Information and Limitation Statements .....</b>	<b>21</b>
Warranty Information .....	21
Limitation Statements .....	21
General Limitation and Risk Assignment.....	21
Exclusion of Incidental, Consequential and Certain Other Damages .....	22
Limitation of Liability and Remedies.....	22
Right to Revise or Update Without Notice.....	22
Governance.....	22
Contact.....	22
<b>Appendix B - List of Acronyms Used in this Document .....</b>	<b>23</b>

## Introduction

**Data Loggers** are instruments with internal memory for data storage that record CAN message data over time. They are based upon digital processors or computers with built in sensors. They are small, battery powered and portable.

They are used for systems validation and development, fixing recurring intermittent failures, solving performance anomalies, competitive performance tuning, and custom data collection applications. They can be used by fleet operations for: On road data collection, vehicle health assessment, fuel economy logging, and route/cost optimization.

**Vehicle Manufacturers and Suppliers: The DG HD Data Logger** can be used for network system development/validation and troubleshooting, emission testing and validation, fuel efficiency analysis, engineering product development/testing and cybersecurity <https://www.dgtech.com/cyber-security/>.

**Features** - Based on the DG Beacon analyzer, the DG HD Data Logger is a digital data collection system that supports an extensive range of vehicle network and data acquisition needs:

### Hardware – consists of:

- Processor – ARM Cortex A8, 1 GHz speed
- RAM 512 Mbytes SDRAM
- NAND Flash Memory – 512 Mbytes
- User Storage: Micro SD card to 64 GBytes
- LCD Display and Keypad

### Setup and Operation – Several features contribute to this area:

- Set-up utilizing a standard laptop for autonomous data logging
- Easy to use
  - Intuitive user interface via portable keypad/display
- Data analysis and file management
  - Custom functionality available
- Suitable for long test runs and fleet data collection

### Software – Several items contribute to this area:

- Linux OS interface (start/stop process)
- On-board Web Server
- TCP/IP support of standard services into the Beacon (FTP, SSH, etc.)
- Module drivers and applications

**Benefits** – There are several contributions for your business by using this system:

- Suited for laboratory and vehicle applications
- Import/Export data management
- Remote control capability for set-up and operation
- Report generation
- Data Logger operates in “passive” mode not effecting the CAN network
- Raw CAN data recorded on all networks
- Logged Data File named in a standard format
- Data logging can be fully operational without a keypad/display connected
- High volume data collection for engineering development
- All logged data files can automatically be transferred to:
  - Internal memory
  - Memory stick
  - Offloaded wirelessly to a network
- Real time Data Display
- Data Storage, at end of run
- Automated Cloud Data Storage allows access via internet

**Use Case** – examples:

- On-road/Off-road Data Logging
- Automated repetitive testing across multiple installations/laboratories
- Remote test execution and data collection
- Fleet data collection
- Fleet application, with analytics
- EOL test system
- Vehicle emissions testing

**Technical Aspects**– examples:

- ECU communications
- RAW CAN Data
- Emission sensor signals
- Auto-baud detect on all channels at power-up
- Automatic or manual start and stop
- Start/stop on triggers (automated)
- Data file can be saved on internal SD card or external device
- Data can be saved in a binary format
- Application to convert to ASC format is available for offline playback

# Data Logger Overview

## Power

- Power to the Beacon is provided from vehicle via the diagnostic link connector.
- Tool is ready to begin data acquisition within a user configurable number of seconds of vehicle ignition ON.

## Hardware Interfaces

The following interfaces are supported: Connection to vehicle via green J1939 type-2 9-pin diagnostic connector (backward compatible with black 9-pin connector from older vehicles) and 16 PIN OBD connector.

- CAN – maximum 3 channels
- LCD display/keypad

The datalogger operates in “passive” mode, so as not to influence the CAN network. The datalogger:

- Will not send any messages, including responses and address claims.
- No additional termination is required for operation.
- Specified Baud Rate set in INI file.

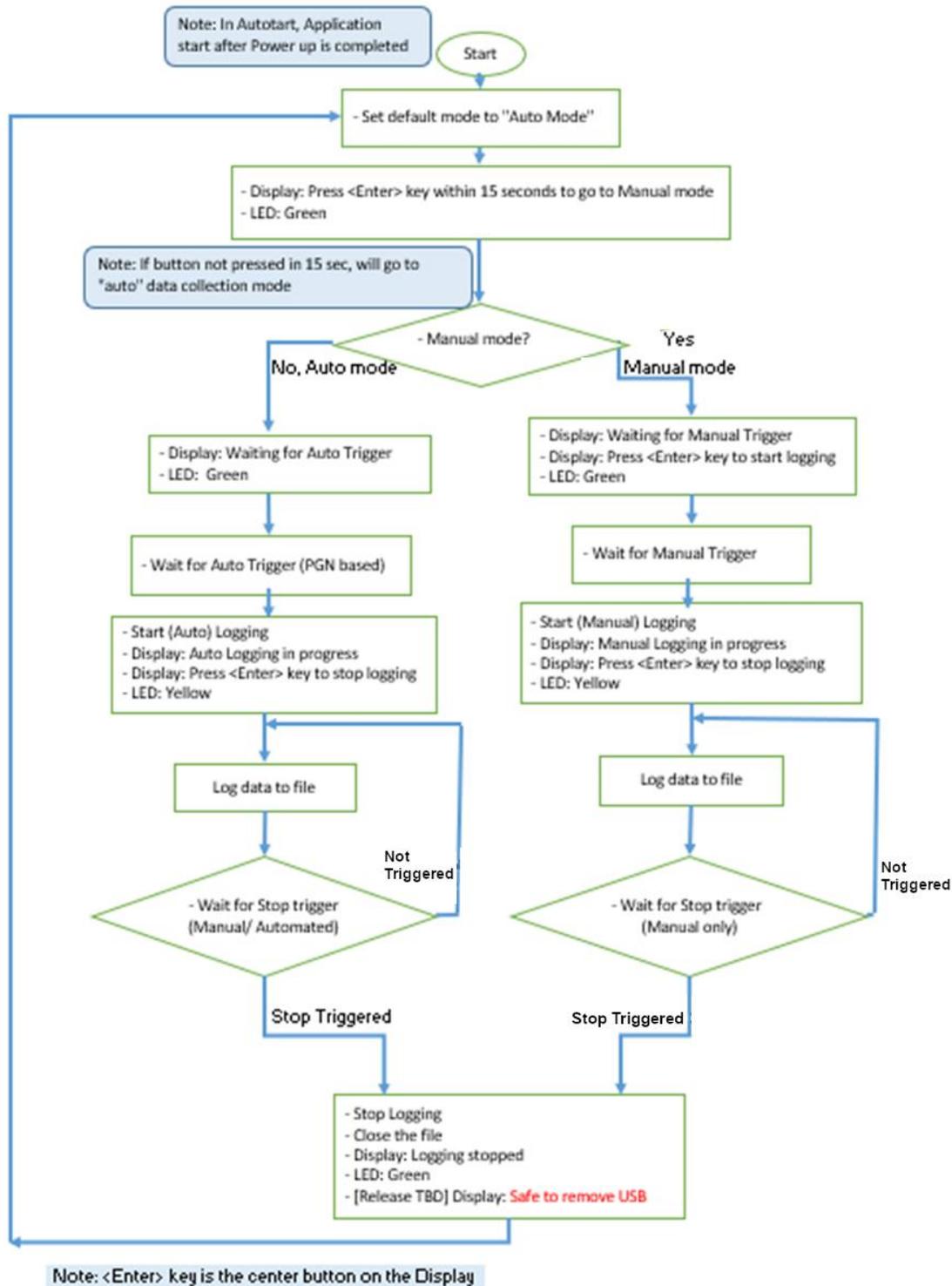
## Trigger Modes

- Auto Trigger is capable of logging in Automatic (display NOT required) or Manual mode, PGN per user input as specified by Triggers in INI File.
- If a keypad is not present, the Data Logger will operate in Automatic mode. Triggers need to be specified in the INI file to run in automatic mode.

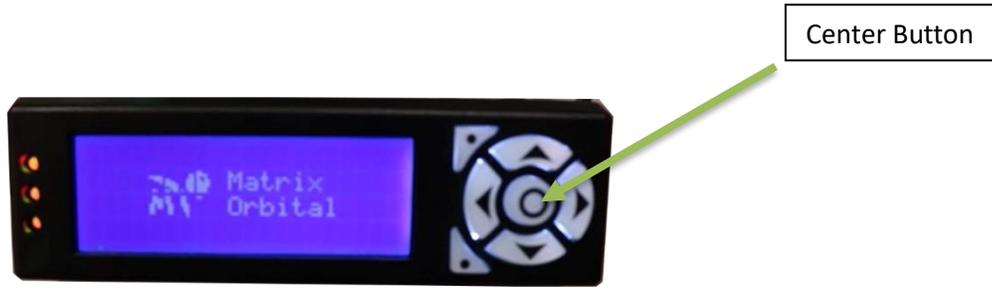
## Operational Sequence

- The Data logger operation is displayed in the following Flow Chart:

## HD Data Logger Application Auto Logging & Manual Logging Flow



## Start Logging Conditions



### Trigger Mode:

In the Automatic mode, the Data Logger logging starts on receipt of any of specific messages (0-255) from the CAN network. The messages are defined in the INI configuration file with the following parameters set as default values in the example shown:

	Trig_Message_1	Trig_Message_2	Trig_Message_3
PGN	61444d/F004h	61442d/F002h	61441d/F001h
Source Address	00h	03h	0Bh
Message Value	EEC1h	EFC1h	EBC1h

### Manual Trigger Mode

Logging starts on press of **Center** button on Keypad.

## Stop Logging Triggers

### Automatic Mode

Logging will be stopped when either of the following trigger conditions is satisfied:

- All the start conditions are FALSE for Trig stop time in seconds.
  - The value of Trig stop time is defined in the INI file, with the default set to 30 seconds.
- Press Center button on keypad.

### Manual Mode

Data logging stops on Press of **Center** button on Keypad.

## Data Logging

CAN data is recorded on all specified channels (RAW CAN as specified in INI file):

- Pins CD (CAN1)
- FG (CAN2)
- HJ (CAN3)

Data will be logged in a binary data file format during the drive cycle:

- One file will be generated for each start-stop sequence.
- The data file will be closed when logging is stopped.

### Log Data File:

- The logged data is saved on the internal SD card.
- Maximum data file can be changed in the INI File.
- If the file exceeds the INI File Maximum Size, it will be closed and a new data file will be started.

### Log Data File Name:

The data file is named as

- Start
  - [StartDate]
  - [StartTime]
- End
  - [EndDate]
  - [EndTime]

Start [StartDate]-[StartTime]\_End [EndDate]-[EndTime]

- StartDate, EndDate in MMDDYY Format.
- StartTime, EndTime in HHMMSS, 24 Hour Format.
  - Example: Start080520-144511\_End080520-144856.asc

## Set-Up – Loading Instructions



- Enable the application by selecting application from the Beacon webpage from your PC.
  - Select the following from the Startup Programs/Services Menu
    - HDLOGGER
  - Reboot the Beacon
    - The program will run after the Beacon has been rebooted.
- Automatic Mode (non-keypad) – Insert pre-formatted (FAT32) USB thumb drive into Beacon included with the kit.
  - The required software will automatically be loaded.
  - The USB thumb drive is now ready to collect data.
- Manual Mode (keypad) - Insert a USB thumb drive into your laptop computer and click on Open folder to view files option.
  - Right click on your thumb drive and click format option.
  - Name the USB thumb drive. An unnamed thumb drive will not be detected by the Linux OS.
  - From the window, select FAT32 from the drop-down bar under File system.
  - Click on start and OK to start the formatting process.
- Insert the thumb drive into the Beacon.
  - Default RAW CAN data will be logged if no USB thumb drive is present.
  - The software will make a directory called **Data\_Logger**.
  - The USB thumb drive is now ready to collect data.

# Data Logger Operation

## USB Thumb Drive

After USB (FAT 32) thumb drive installation for both Automatic and Manual Modes

- Connect to the Data Logger device in the truck to the Diagnostic Link Connector (Deutsch connector etc.).
- Ignition ON
  - Data logger functions in the background when the truck is running based upon configuration as defined in the INI file (for detailed information refer to <https://www.dgtech.com/documents/>).
  - Data acquisition occurs when START conditions are satisfied.
  - Data is saved on the Beacon's internal SD-card.
  - Data files are converted and transferred from binary to ASC and transferred to the internal SD-card to the USB thumb drive.
  - Data acquisition stops per defined STOP conditions (MB limits defined in INI File).
- The Display shows the status of the Data Acquisition (messages, LEDs).
  - There can be multiple drive cycles before removing the USB thumb drive.
  - The USB thumb drive contains all the collected data.
  - Once the display states "Copy Done" it is safe to remove the USB thumb drive from the Beacon.
- If a USB thumb drive is plugged in after the logging operation has begun:
  - Device will sense that a USB thumb drive is inserted into the drive.
  - The log files on present on the SD-card will be converted to the .ASC format and written to the USB thumb drive.
  - LED status lights indicate file transfer activity.
  - If the USB thumb drive is full while data is being transferred, the oldest file on the thumb drive will be deleted.

## User Interface

Keypad: the **center** button is used as follows:

- Automatic mode: Stop a current data logging session.
- Manual mode: Start/Stop data logging

## Display

The messages on the Display are noted on the Flow Chart and the LED's are noted on the Flow Chart and represented below:

Num	Message	LED State
1	Press ENTER within Trig_man_time seconds to go to Manual Mode	GREEN
2	Waiting for Auto Trigger	GREEN
3	Waiting for Manual Trigger. Press ENTER to Start logging	GREEN
4	Auto Logging in Progress. Press ENTER to Stop Logging	YELLOW
5	Manual Logging in Progress. Press ENTER to Stop Logging	YELLOW
6	Logging Stopped	YELLOW
7	Transfer to USB Stick – Safe to remove stick	GREEN

When logging is terminated and a log file is closed on the internal SD card, if a USB thumb drive is present:

- The log file is converted to a .ASC file.
- The .ASC file is written to the USB thumb drive.

### Datalogger Settings

Determine the required data logger settings (the various parameters are described below)

- Various settings include;
  - Data collection mode:
    - Automatic – presence of a trigger
      - Automatic data collection
      - Auto trigger cannot stop manually
    - Manual – selected by the keypad
      - Will not stop collecting data unless push center button
    - Automatic with Manual Override
  - Start Conditions:
    - Set Trigger
      - Based upon 1 to 255 messages defined by PGN
      - Message value/SA (example PGN1=0xF001)
  - Stop Conditions:
    - Set Stop Condition
      - Trigger Stop Time (example=30 // in seconds)
  - Baud Rates:
    - Select on each of the channels

## Edit the Configuration File on a PC - INI File

The Application has configurable parameters that are defined in an INI file. The INI file is named **DataLogger.ini** and is case-sensitive. **Only need to specify channels that are to be logged.** See INI File example below:

```
//  
  
// Provide definitions to avoid hard coding of variables  
  
//  
[FileNames]  
DebugLogFile=DataloggerDebugFile  
  
[ConfigurationInfo]  
MaxLogFileSize=1      // in MB  
WriteConvertedFilesToBeaconDrive=no  
TimeToSelectManualMode=15 // in seconds  
TriggerStopTime=30    // in seconds  
RxTimeout=50          // in ms  
  
[Triggers]  
PGN1=0xF001  
PGN2=0xF002  
PGN3=0xF004  
  
[ChannelBitRates]  
Channel1=250000  
Channel2=250000  
Channel3=250000
```

**DataLogger.ini** is to be placed in the **Data\_Logger** directory of the USB thumb drive.

## USB Thumb Drive Operation

At Power up, the application checks for the presence of a USB thumb drive in the USB drive and reads the configuration file if present in the **Data\_Logger** directory of the USB thumb drive.

If a USB thumb drive is present in the **Data\_Logger** directory of the USB thumb drive:

- Any existing log files on the SD Card will be converted to a .ASC format and transferred to the **Data\_Logger** directory of the USB thumb drive

When logging is terminated and log file is closed on the internal SD card and a USB thumb drive card is present:

- The log file is converted to a .ASC file.
- The .ASC file is written to the USB thumb drive

When logging is terminated and a log file is closed on the internal SD card, if a USB thumb drive is present:

- The log file is converted to a .ASC file.
- The .ASC file is written to the USB thumb drive.

After configuration and the file has been written, the file will be deleted from the SD card:

- File conversion and copying is run in the background process.
- If a USB thumb drive is plugged in after the logging operation has begun:
  - Device will sense that a USB thumb drive is inserted into the drive.
  - The log files on present on the SD-card will be converted to the .ASC format and written to the USB thumb drive.
  - LED status lights indicate file transfer activity
  - If the USB thumb drive is full while data is being transferred, the oldest file on the thumb drive will be deleted.

## For Data Logger Operation with a USB Thumb Drive

Load the configuration INI file on to the USB thumb drive

- Connect the USB thumb drive to the Beacon
  - The data logger functions when the truck is running:
    - START/STOP conditions and other parameters are defined in the INI file.
    - Data acquisition occurs when manual/automatic START conditions are satisfied.
    - Data is saved on the Beacon's internal SD-card in binary format.
    - Data files are converted from binary to ASC and transferred from the SD-card to the USB thumb drive.
    - Data acquisition stops per defined STOP conditions.
    - Some DL control functions are provided via the keypad.
  - The Display shows the status of the Data Acquisition (messages, LEDs) and User prompts.
  - Whenever a drive cycle is completed:
    - Logged data files on the Beacon's SD Card are closed.
    - The data files are converted and transferred to the USB thumb drive (if available) and can take 15-60 seconds to convert from binary to ASC based upon log file size.
  - Multiple drive cycles are possible before removing the USB thumb drive.

## For Data Logger Operation Without a USB Thumb Drive

Uses the INI file in the Beacon Directory

### The Display

Prompts the user for real-time commands and provides the status of Data Acquisition by:

- Messages
- LED's

### After Data Logging is Completed

Multiple drive cycles are possible before removing the USB thumb drive.

- If a USB thumb drive is present
  - Wait 10 seconds to allow conversion of data files before shutting off the engine
  - The USB thumb drive has saved all the data files
    - Can be safely removed at this time
- If a USB thumb drive is absent
  - The engine can be turned off immediately
  - All data files will be saved

## Configuration parameters in INI file

3 Triggers for Automatic Data collection start. Default values shown below (can be changed by the user in the INI file as needed):

- //
- // Provide definitions to avoid hard coding of variables
- //
- [ConfigurationInfo]
- MaxLogFileSize=100 // in MB
- TimeToSelectManualMode=15 // in seconds
- TriggerStopTime=30 // in seconds
- RxTimeout=50 // in ms
- [ChannelBitRates]
- Channel1=250000
- //Channel2=250000
- //Channel3=250000
- [Triggers]
- PGN1=0xf00400
- PGN2=0xf00203
- PGN3=0xf0010b

### Optional HD DL Kit

- Beacon
- LCD Display and Keypad (P/N ELK204-7T-USB-PL)
- 9 PIN Deutsch Cable (P/N DG-295-10811) \*
- 16 PIN J1962 OBDII Cable (P/N 295-DGT-1000717) \*
- USB thumb drive – 16GB or more

\*Dependent on customer choice



**15 FOOT USB CABLE WITH  
THUMB SCREWS  
(DG-15-1-USB-CABLE)**



**DPA 5 VOLVO/MACK OBDII  
APPLICATIONS CABLE  
(DG-V13-CABLE-KIT)**



**9 PIN DEUTSCH CABLE  
(DG-646-9PIN-CABLE)**



**LCD DISPLAY AND KEYPAD  
(ELK204-7T-USB-PL)**



**USB Thumb Drive**

### Beacon Manual

For specific information on Beacon operation refer to Beacon Manual –

<https://www.dgtech.com/wp-content/uploads/2018/01/Beacon User Manual.pdf>

## Technical Support and Return Merchandise Authorization

After reading and following the troubleshooting and validation procedures in this document please check the FAQ page at [www.dgtech.com/faqs](http://www.dgtech.com/faqs). If you are still not able to resolve an issue, please feel free to contact DG technical support. For users in the United States, technical support is available from 9 a.m. to 5 p.m. Eastern Time. You may also fax or e-mail your questions to us. For prompt assistance, please include your voice telephone number and the serial number located on the bottom of your HD (Beacon) Data Logger.

### DG Technologies Technical Support



Phone: (248) 888-2000

Fax: (248) 888-9977

E-mail: [techsupp@dgtech.com](mailto:techsupp@dgtech.com)

Web site: [www.dgtech.com/tech-support](http://www.dgtech.com/tech-support)

*Users not residing in the United States should contact your local DG representative or e-mail [techsupp@dgtech.com](mailto:techsupp@dgtech.com)*

## Return Merchandise Authorization (RMA)

If technical support has deemed that there may be a physical problem with your HD Data Logger, you will be issued you an RMA number. You would then return the product along with any documentation of ownership you have (proof of purchase/price) to the following address:



Product Repair Services

Attn: RMA# xxxxxxx

DG Technologies

33604 West 8 Mile Road

Farmington Hills, MI 48335

## Appendix A. Warranty Information and Limitation Statements

### Warranty Information

DG Technologies, Inc. the HD Data Logger is warranted against defects in materials and workmanship for two (2) years following date of shipment. Cables (both USB and vehicle) are warranted for 90 days.

DG Technologies will, at its option, repair or replace, at no cost to the customer, products which prove to be defective during the warranty period, provided the defect or failure is not due to misuse, abuse, or alteration of the product. The customer is responsible for shipment of the defective product to DG. This warranty does not cover damage to any item that DG Technologies, determines has been damaged by the customer's abuse, misuse, negligence, improper assembly, modification, or operation of the product.

A Return Merchandise Authorization (RMA) number must be issued to the customer by our Technical Support Department at (248) 888-2000 and must be included with the product being returned (for more details, see section *Return Merchandise Authorization (RMA)*). The HD Data Logger is warranted for 90 days after a warranty repair, or to end of the original factory warranty period, whichever is longer.

### Limitation Statements

#### General Limitation and Risk Assignment

To the maximum extent permitted by applicable law, DG Technologies and its suppliers provide support services on an “as-is” basis and disclaim all other warranties and conditions not specifically stated herein, whether express, implied or statutory, including, but not limited to, any warranties of merchantability or fitness for a particular purpose, lack of viruses, accuracy or completeness of responses, results, lack of negligence or lack of workmanlike effort, and correspondence to description. The user assumes the entire risk arising out of the use or performance of the device, its operating system components, and any support services.

## Exclusion of Incidental, Consequential and Certain Other Damages

To the maximum extent permitted by applicable law, in no event shall DG Technologies or its suppliers be liable for any special, incidental, indirect or consequential damages whatsoever, including but not limited to: damages for loss of profit, loss of confidential or other information; business interruption; personal injury; loss of privacy, failure to meet any duty (including good faith or of reasonable care); negligence; and any other pecuniary or other loss related to the use of or the inability to use the device, components or support services or the provision of or failure to provide support services or otherwise in connection with any provision, even if DG Technologies or any supplier has been advised of the possibility of such damages.

## Limitation of Liability and Remedies

Notwithstanding any damages that you might incur for any reason whatsoever (including, without limitation, all damages referenced above and all direct or general damages), in no event shall the liability of DG Technologies and any of its suppliers exceed the price paid for the device. The user assumes the entire risk and liability from the use of this device.

## Right to Revise or Update Without Notice

DG Technologies reserves the right to revise or update its products, software and/or any or all documentation without obligation to notify any individual or entity.

## Governance

The user agrees to be governed by the laws of the State of Michigan, USA, and consents to the jurisdiction of the state court of Michigan in all disputes arising out of or relating to the use of this device.

## Contact

Please direct all inquiries to:

DG Technologies  
33604 West 8 Mile Road  
Farmington Hills, MI 48335  
Phone (248) 888-2000  
Fax (248) 888-9977

## Appendix B - List of Acronyms Used in this Document

Various acronyms have been used throughout this document.

Acronym	Description
API	Application Programming Interface
CAN	Controller Area Network
DG	DG Technologies
ID	Identification
ISO	International Standards Organization
LED	Light Emitting Diode
OBD	On Board Diagnostics
OEM	Original Equipment Manufacturer
PC	Personal Computer
RAM	Random Access Memory
SAE	Society of Automotive Engineers
TMC	Technology and Maintenance Council
UAC	User Account Control
USB	Universal Serial Bus
VDA	Vehicle Datalink Adapter