User Documentation

DiaLog

Influx Technology
WWW.INFLUXTECHNOLOGY.COM

1– Introduction

1.1—Overview

DiaLog is a complete data logging environment, which when combined with a Rebel data logger becomes a very flexible and powerful solution. DiaLog combines full data logger configuration capabilities, a graphics and data analysis package* and a number of administration facilities, with user-friendly graphical interfaces and an intuitive layout. DiaLog provides an easy to use environment capable of configuring data loggers to record any combination of data, retrieve the recorded data by multiple direct and remote methods and finally analyse the recovered data or prepare it for import into external tools.

- Construct complex data logger configurations for the most challenging applications using a simple graphical interface allowing intuitive construction from individual components and no need for scripting.
- Simple and efficient database system allows easy configuration administration, supporting import and export features and simple component transferal between configurations.
- Create complex Triggers with up to 30 conditions and 30 events with logic and formulaic application.
- Write customisable user messages for transmission to a vehicle.
- Conversion tables and formulae for instant scaling or feedback in engineering units.
- Configurable output signals.
- Supports multiple methods for data logger configuration, both directly and remotely.
- Provides USB, WiFi and GPRS connectivity.*
- Simple recorded data retrieval by direct or remote connection to the data logger.
- Live connection to the Rebel while data logging, allows personal control and live data feed.
- Powerful Data Analysis suite boasting data scaling, multiple data plotting, XY scatter plots and dual cursors and calculated channels among many other features.
- Supports all common data formats for simple data import and transfer to alternative software packages.
- ‘Listen only’ mode logging, allowing the recording the raw CAN data for up to 50 signals.
- Perform and store complete EOBD/OBDII reports on trigger commands.
- Convert and export multiple data files to a selection of formats and create one-shot event reports for multiple triggers.
- J1939 signal monitoring and DBC import.

1.2—Licence Agreement

LICENCE AGREEMENT

NOTICE TO ALL USERS: CAREFULLY READ THE FOLLOWING LEGAL AGREEMENT ("AGREEMENT"), FOR THE LICENCE OF SPECIFIED SOFTWARE ("SOFTWARE") PRODUCED BY INFLUX TECHNOLOGY LTD ("INFLUX"). BY CLICKING THE ACCEPT BUTTON OR INSTALLING THE SOFTWARE, YOU (EITHER AN INDIVIDUAL OR A SINGLE ENTITY) CONSENT TO BE BOUND BY AND BECOME A PARTY TO THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CLICK THE BUTTON THAT INDICATES THAT YOU DO NOT ACCEPT THE TERMS OF THIS AGREEMENT AND DO NOT INSTALL THE SOFTWARE.

1. Influx grants the right to use the 'Influx Software' by means of a software licence. Influx retains title to the 'Influx Software' software. For the purposes of this agreement, Influx and the authors are considered to be one and the same.

2. `Use' means loading the 'Influx Software' into RAM, or installation on a hard disk or floppy disk or any other storage device.

3. Ownership of the 'Influx Software'. As the licensee, you own the magnetic or other physical media on which the 'Influx Software' is originally or subsequently recorded or fixed, but an express condition of this licence is that Influx retains title and ownership of the 'Influx Software' recorded on the original disk copy(s) and all subsequent copies of the 'Influx Software', regardless of the form or media in or on which the original and other copies may exist. This license is not a sale of the original software or any copy.

4. COPYRIGHT of the 'Influx Software' belongs to Influx and is protected by the relevant copyright laws. All rights reserved.

5. You may not alter or remove this notice of copyright and conditions of use from the 'Influx Software'.

6. You may not modify, adapt, translate, reverse engineer, decompile, disassemble or create derivative or written works based on the 'Influx Software'. You may not modify, adapt, translate or create derivative or written works based on the written materials without the prior written consent of Influx.

7. Transfer restrictions. This software is licensed only to you, the licensee, and may not be transferred to an individual or company without the prior written consent of Influx. Where permission is so given, all copies of the 'Influx Software' including security unlock codes, back-up copies and documentation must also be transferred. Any authorized transferee of the 'Influx Software' shall be bound by the terms and conditions of this licence and limited warranty. In no event may you transfer, assign, rent, lease, sell or otherwise dispose of the 'Influx Software' on a temporary or permanent basis except as expressly provided herein.

8. The 'Influx Software' may be physically transferred to another single computer along with the security unlock codes by using the utility routines provided. NO copies of the 'Influx Software' (other than those additional copies purchased as part of a site license or network agreement) may be used on more than one computer at one time.

9. Termination. This licence is effective until terminated. The licence will terminate automatically without notice from Influx if you fail to comply with any provision of this license. Upon termination you shall destroy the written materials and all copies of the 'Influx Software', including modified copies, if any.

10. Update policy. Influx creates from time to time updated versions of the 'Influx Software'. At its option, Influx will make such updates available to licensee and transferees who have paid the update fee (where appropriate) and registered the 'Influx Software' with Influx or its agents.

11. So long as you comply with the Influx licence agreement, the 'Influx Software' may be accessed by any convenient method.

LIMITATION OF LIABILITY

12. The information contained in the 'Influx Software' has been compiled from tests and measurements made on a small sample of vehicles with the appropriate mechanical and electronic systems, and information contained in manuals produced by vehicle and electronic system manufacturers. Although all reasonable care has been taken in ensuring accuracy of the information contained in the 'Influx Software', neither the authors, or Influx, or Influx's agents may be held responsible for incorrect or inaccurate information, or incorrect descriptions of test procedures.

13. LIMITED WARRANTY: Influx warranties that the media on which the 'Influx Software' is supplied will be free from defects in materials or workmanship under normal use and service for a period of 30 days from the date of receipt.

14. Influx disclaims all other warranties either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the 'Influx Software', any accompanying documentation and any accompanying hardware. The 'Influx Software' is used at your own risk.

15. In no event shall Influx, its authors nor anyone involved in the creation, production, sale or delivery of this product be liable for any damages whatsoever (including without limitation, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arriving out of the use of or inability to use this Influx product, even if Influx has been advised of the possibility of such damages.

16. By the act of using this 'Influx Software', you agree to be bound by all terms and conditions. Do not use the 'Influx Software' otherwise.

17. If you do not agree with these conditions, you should promptly return the 'Influx Software' (including all media, documentation and packaging) to your supplier.

18. None of the provisions affect your statutory rights. Where legislation disallows the exclusion or limitation of implied warranties, these will not apply to you.

1.3—System Requirements

Minimum computer system requirements for effective running of DiaLog:

Windows XP, Windows Vista, Windows 7, 8, 8.1 or 10
512MB System RAM
800MHz or equivalent Processor

Influx Technology recommended minimum requirements:

Windows XP, Windows Vista, Windows 7, 8, 8.1 or 10
1GB System RAM
1GHz or equivalent

1.4—Software Versions

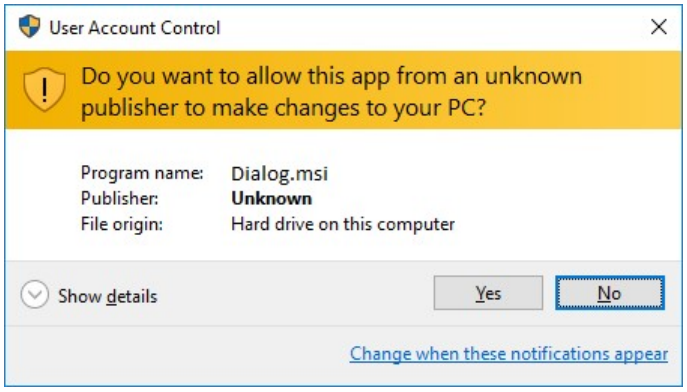
DiaLog is available in a number of software versions supporting different levels of functionality. The features supported and their relevant sections in this document are summarised below.

Feature	Section	Configurator	Plus
Import A2L Files			✓
Import DBC Files		✓	✓
Import ODX Files			✓
Import ROB Files			✓
Export ROB Files			✓
Export DBC Files			✓
Export ODX Files			✓
Live Data			✓
Oscilloscope			✓
One-Shot (Event) Lists			✓
StreamLog Application Support			✓
Triggers			✓
Output Signals			✓
Conversion Tables			✓
Custom Message Constructor			✓
Printout Reports			✓
StreamLog Data Stream Channels			✓
Export To MDF File Format			✓
Export To CSV File Format		✓	✓
Export To Matlab File Formats			✓
Export GPS Data			✓
Export One-Shot (Event) Data			✓
Export Raw CAN Data		✓	✓
Data File (IVD) Merging		✓	✓
Batch Conversion and Merging			✓
Batch Report			✓
DTC Data Analysis Tab			✓
EOBD Data Analysis Tab			✓
Broadcast CAN Data Tab		✓	✓
HS CAN Bus		✓	✓
MS CAN Bus			✓
INST CAN Bus			✓
Instrumentation Bus			✓
Digital Bus		✓	✓
GPS Bus		✓	✓
CCP/xCP Protocol Support			✓
CAN Monitoring Support		✓	✓
Diagnostics		✓	✓
DBC Editor			✓
Periodic Identifier Database Editor		✓	✓

2—Getting Started

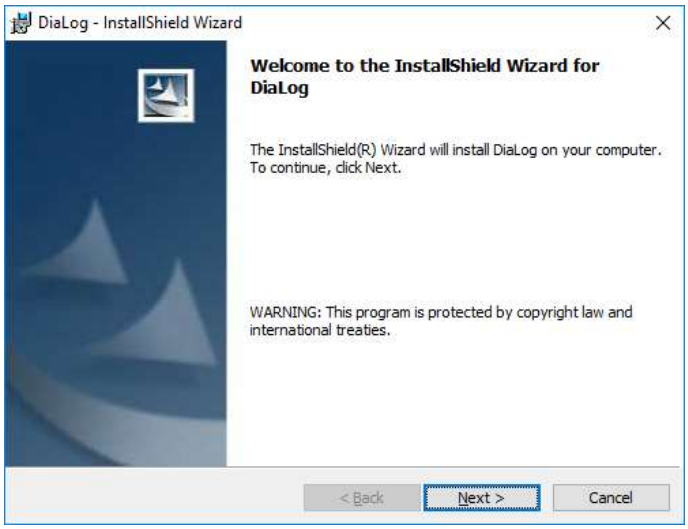
2.1—Software Installation

To begin installation of the DiaLog software open the installer by running the set up file.



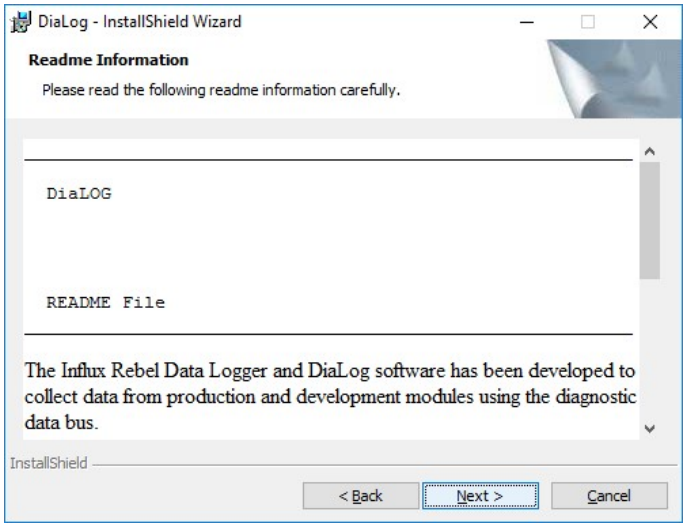
This is an in-built Windows security warning,

- To begin installation click 'Run'

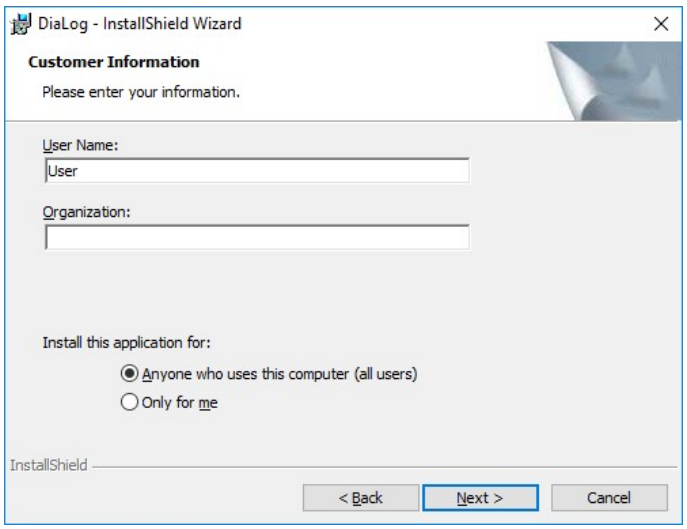


- To continue with the installation of DiaLog on your system click 'Next'.
- To cancel the installation at this stage click 'Cancel'. (No software will have been installed on the system at this point.)

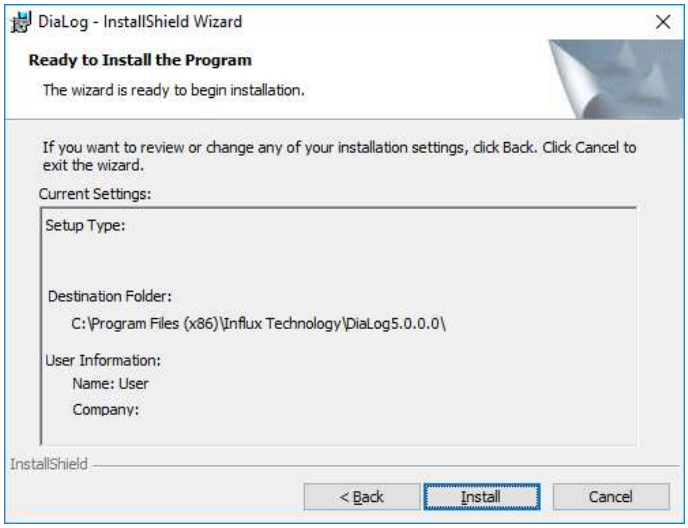
- Please Read the licence agreement carefully.
- Once you understand and accept the licence agreement please click 'I accept the terms in the licence agreement' to be able to continue with the installation of DiaLog. If you do not accept the terms please click 'Cancel' to stop the installation at this point.
- Click 'Next' to continue the installation process.



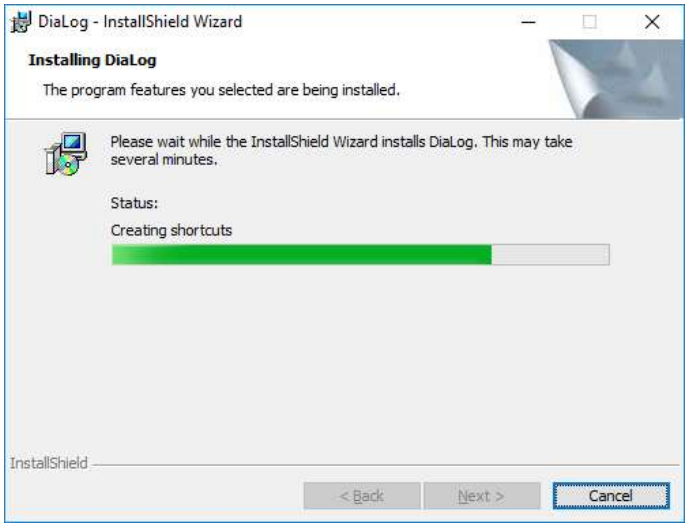
- A summary of the installation information, stating the default installation location and the user details.
- Click ‘Next’ to commence the installation.



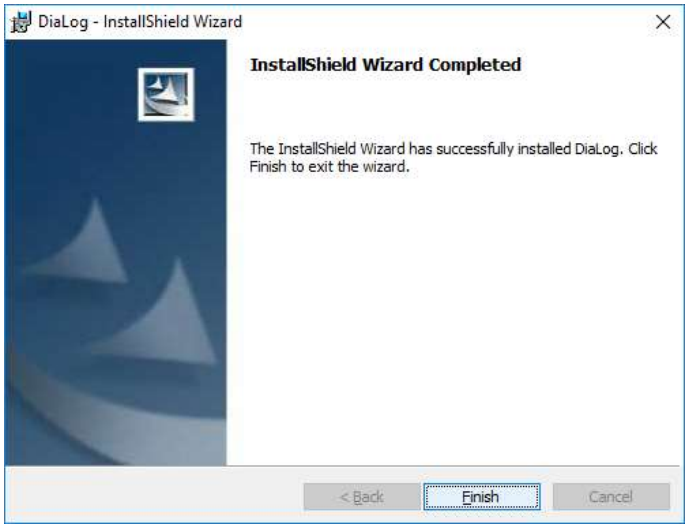
- Complete the ‘User Name’ and ‘Organisation’ fields appropriately.
- Select the preference for computer user installation, to determine which computer users will have access to the DiaLog software.
- Click ‘Next’ to continue with the installation.



- Please review the ‘Readme’ information.
- Once ready, click ‘Next’ to continue with the installation



- Installation has commenced and may take some time to complete.
- Do not restart your computer during the installation process.
- To stop the installation at this point click ‘Cancel’. (This may result in a fragmented version of the software on the system.)



- Once the installation is complete this window will appear.
- Click ‘Finish’ to close the window, DiaLog is now successfully installed on your system.

With installation completed, if this is the first install on the computer, the user will be required to complete the licensing procedure.

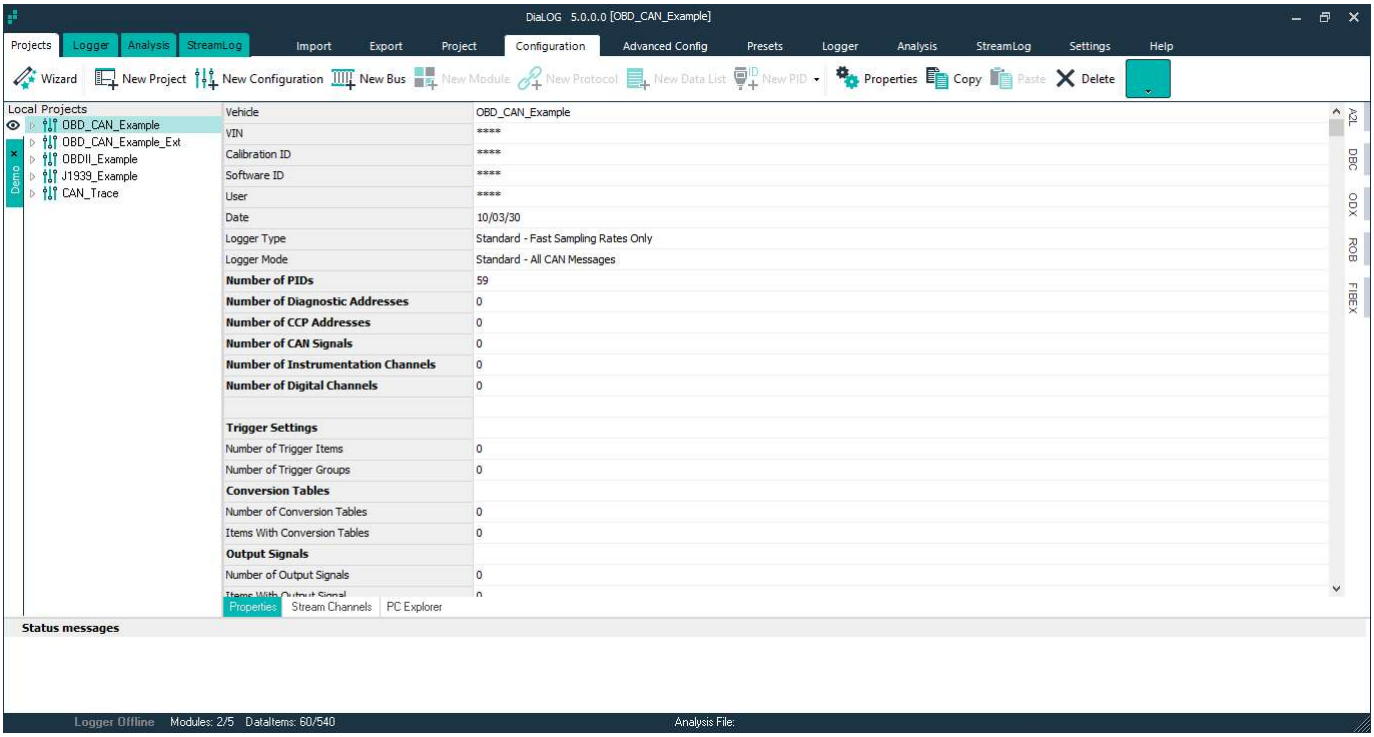
2.2—Software Introduction

2.2.1—Graphical Overview

DiaLog is accessed using either the desktop icon:

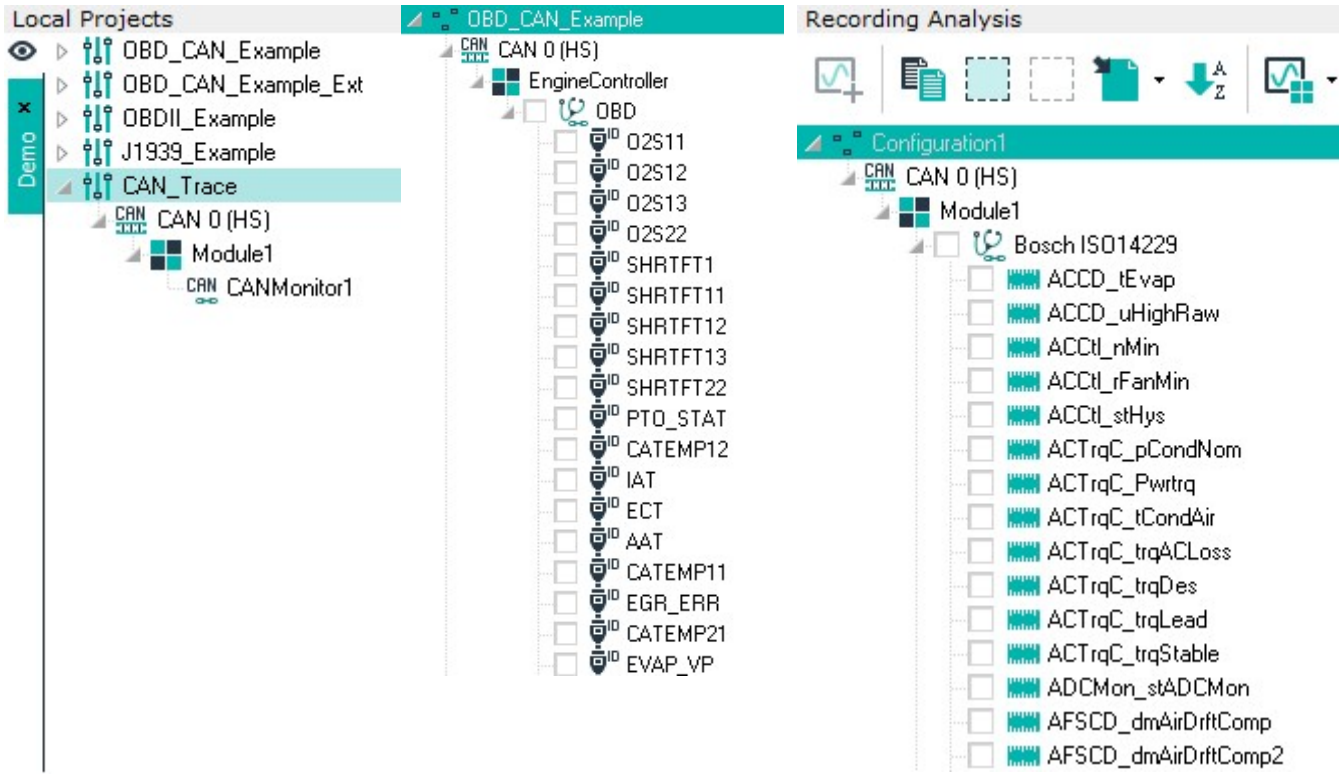
or the ‘Start Menu’ directory—’All Programs\Influx Technology’.

Once started the user is presented with the following opening screen:



2.2.2—Database Panel

The ‘Database’ panel is located on the left-hand side of the application and is used to control the main functionality of the software. The main features are grouped into three (four including StreamLog) sections, navigated by the tabs found at the Top of the Application. The main tabs can be seen below.



Local Projects

The ‘Projects’ tab is used to create and administer the configurations for every data logging application.

Logger Structure

The ‘Logger’ tab becomes active when a data logger is connected to the computer. It then displays the current configuration of the data logger and provides a number of Rebel data logger settings and features.

Recording Analysis

The ‘Analysis’ tab contains the data handling and analysis features incorporated within DiaLog.

The operation of the main features of each of the ‘Database Panel’ tabs and the complete process of performing data logging is explored in the Quick Start Guide

2.2.3—Navigation Bar

The ‘Navigation Bar’ is situated at the top of the software screen and can be used to navigate to the majority of the program features, the features presented depend menu option selected and configuration e.g. Logger Online.

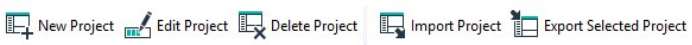
2.2.3.1—Navigation Bar – Configuration Menu

- Wizard—Allows for rapid wizard assisted configuration of the Data Logger
- New Project—Allows new Projects to be created to contain configuration
- New Bus—Allows the user to create a new ‘Bus’ item
- New Module—Allows the user to create a new ‘Module’ item
- New Protocol—Allows the user to create a new ‘Protocol’ item
- New Data List—Allows a new ‘Data List’ DAQ List or Polled List to be created.
- New PID—Allows the user to manually create a new Periodic Identifier
- Properties—Allows the user to edit the properties of the selected item
- Copy—Allows the user to Copy the selected item(s)
- Paste—Allows the user to paste the copied item(s)
- Delete—Allows the user to Delete the selected item(s)

2.2.3.2—Navigation Bar – Advanced Configuration Menu

- New/Edit Triggers—Allows Triggers to be added to a configuration to enable the Logger to be reactive to events
- New/Edit Output Signal—Allows Messages to be created to output to Control Units, Instrumentation, Displays or other tools
- New/Edit Conversion Table—Allows look up tables to be created to allow non-linear sensors to be calibrated to show true input values
- Configuration Report—Allows a user to generate a report that Details some or all of the following information:
- Vehicle Information, Triggers, Bus and Protocol Information, PIDs, Diagnostic Addresses, CCP Addresses, Event Lists, CAN Signals, Instrumentation Channels and Digital Channels

2.2.3.3—Navigation Bar – Project Menu



- New Project—Allows new Projects to be created to contain configuration
- Edit Project—Allows a Projects name to be changed
- Edit Project—Allows a Project to be deleted
- Import Project—Allows a Project to be imported into the database
- Export Selected Project—Allows a Project to be exported to a *.dpv file

NOTE: Projects May also be hidden using the X on the projects tab on the very left of Dialog, this will not Delete the Project, it will simply hide it can be unhidden using the button

2.2.3.4—Navigation Bar – Import Menu

- Import Configuration—Allows a configuration to be imported into the selected Project
- Allows Recorded Data—Allows Data to be opened for Analysis or Export
- Import Project—Allows a Project to be imported into the database
- Load A2L—Allows the user to import an .A2L file into DiaLog and automatically opens the 'ASAP Item Selection' panel
- Load DBC—Allows the user to import a .DBC file into DiaLog and automatically opens the 'DBC Item Selection' panel
- Load ODX—Allows the user to import an .ODX file into DiaLog and automatically opens the 'ODX Item Selection' panel
- Load ROB—Allows the user to import a .ROB file into DiaLog and automatically opens the 'ROB Item Selection' panel
- Load FIBEX—Allows the user to import a FIBEX file into DiaLog and automatically opens the 'FIBEX Item Selection' panel

2.2.3.5—Navigation Bar – Export Menu

- Export Configuration—Allows a configuration to be exported
- Export Recorded Data—Allows Data to be saved as an *.ivd file
- Export Description—Allows Data Item Descriptions to be exported in *.rob file format.
- Export CFF—Export to *.cff file format.
- Export LAB—Export to *.lab file format.

2.2.3.6—Navigation Bar – Presets Menu

- Edit PID Presets—Allows On-board diagnostics Parameter IDs and Diagnostic Trouble Codes presets to be edited.
- Edit J1939 Presets—Allows the J1939 Diagnostic Trouble Codes presets to be edited
- Table/Formula Library—Formula Library—Opens the 'Conversion Methods Library'
- Show DBC Editor—Opens the in-built DBC file editor

2.2.3.7—Navigation Bar – Logger Menu

- Refresh Device Structure—Loads the active configuration resident in the Logger
- Send Configuration to the Logger—Sends the selected configuration to the Logger and activates it.
- Start—Starts the Logger if logging has been stopped
- Stop—Stops the Logger if it is recording
- Set Time—Set the real time clock in the Logger
- Settings—Find information about the Hardware, Set WiFi and GPRS settings
- Reflash—Update Logger firmware and get diagnostics information

2.2.3.8—Navigation Bar – Analysis Menu

- Add To Chart—Add Data Item to the Oscilloscope
- Show Scope—Show the Oscilloscope
- Backup IVD File—Allows backup of IVD files
- Batch Processing—Allows the user to export multiple data files to a number of alternative formats
- Merge IVD Files—Allows the user to select multiple .IVD files to be merged into a single 'Data File'
- Oscilloscope settings—Opens the 'Oscilloscope settings' window

2.2.3.9—Navigation Bar – StreamLog Menu

- StreamLog—Show the Remote Database Server
- StreamLog Settings—Set the Address and Password for the StreamLog Server

2.2.3.10—Navigation Bar – Settings Menu

- Options—Set the General Options for DiaLog
- Oscilloscope settings—Opens the 'Oscilloscope settings' window
- Logger Communication—Set the Interface you wish to communicate with the Logger on
- StreamLog Settings—Set the Address and Password for the StreamLog Server

2.2.4—Import Tabs

Located on the far right of the software window, the 'Import' tabs allow the user to import items from a variety of description files. For full details on 'Data Items' see the relevant sections.

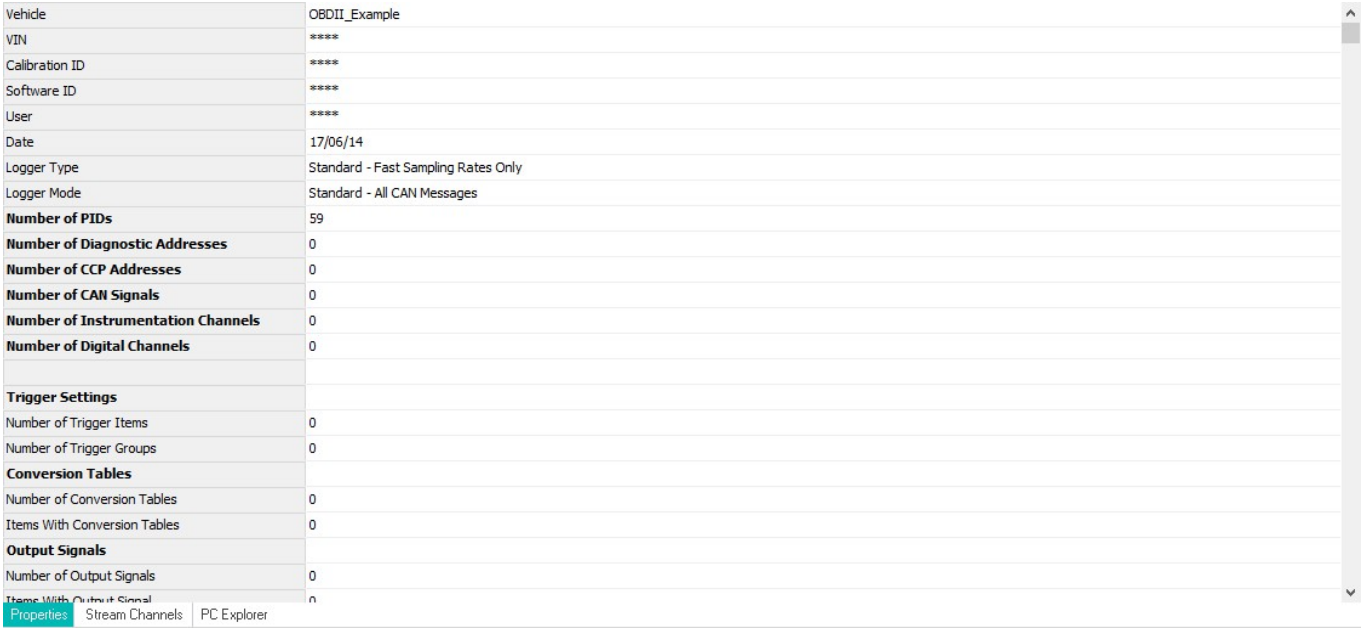
1. ASAP Import
2. DBC Import
3. ODX Import
4. ROB Import
5. Flexray FIBEX Import

2.2.5—Main Panel

The ‘Main’ panel of the software window is multi-functional and has a number of display modes:

‘Properties’ - Displays the properties/summary for the selected item in the ’Database’ panel.
‘Data Items’ - Lists all the ‘Data Items’ present on a particular ‘Protocol’
‘Stream Data’ - Lists the ‘Data Items’ selected for constant transmission to the server. (StreamLog functionality for customers only, see StreamLog manual.)
‘Live Data’ - Oscilloscope function for data currently being logged by the Logger.

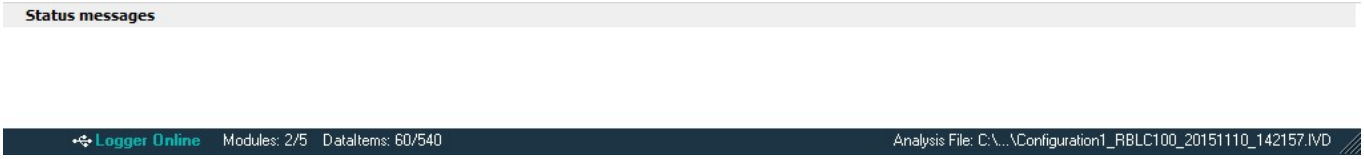
The default setting for this panel displays the properties of the selected item in the ‘Database’ panel and can be seen below.



2.2.6—Message Panel

2.2.6.1—Status Message panel

The ‘Status Message’ panel displays the date, time and origin of all messages relating to the status of the software and any hardware connected and online.



The panel also contains a ‘right click’ menu as shown below.

View—Provides a list of selectable data columns to display as well as a ‘show last message’ selection function.
Clear message—Removes the highlighted message from the list.
Clear all messages—Removes all messages from the panel.
Save all messages—Provides the option to save the messages in a variety of formats: .log, .doc, .xls, .html and .csv.

2.2.6.2—Status Bar

The ‘Status Bar’ is used to display a number of key pieces of information that remain visible during all the software operations.

From left to right.

Rebel Status—Indicates the connection status of the Rebel by any of the connection methods.
Modules—Indicates to the user the number of ‘Modules’ created for the current ‘Configuration Structure’, with a maximum of five.
Data Items—Indicates the number of ‘Data Items’ implemented in the current ‘Configuration Structure’, with a maximum of 540 or 800(ARM processor based Rebel Loggers).
Analysis File—Displays the .IVD data file currently imported into the ‘Recording Analysis’ panel.

3—Quick Start Guide

3.1—Introduction

DiaLog is designed to allow the easy and quick facilitation of the set up and running of Rebel data loggers and the collection and analysis of the recorded data.

DiaLog and the Rebel data logger are designed with a multitude of users in mind and as such the steps to begin logging with the Rebel are purposefully very simple and quick, with many more features and abilities available to the user upon further investigation.

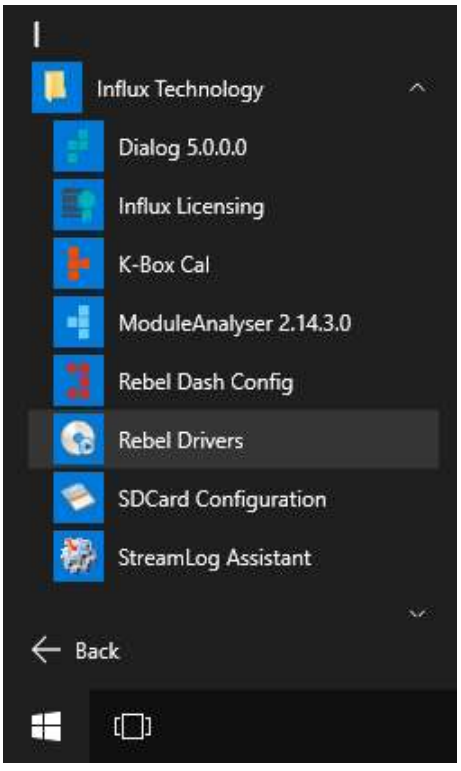
The Quick Start Guide demonstrates the complete procedure for utilising the Rebel data logger. Starting with the connection and configuration of the Rebel data logger. The guide then shows the user how to perform a very common and useful task—data logging a variety of Powertrain data. The method for collecting and analysing the recorded data is then considered.

The processes involved in performing these tasks are common to the general application of the software and provide the user with a functional introduction to using DiaLog and the Rebel.

3.2—Rebel Drivers

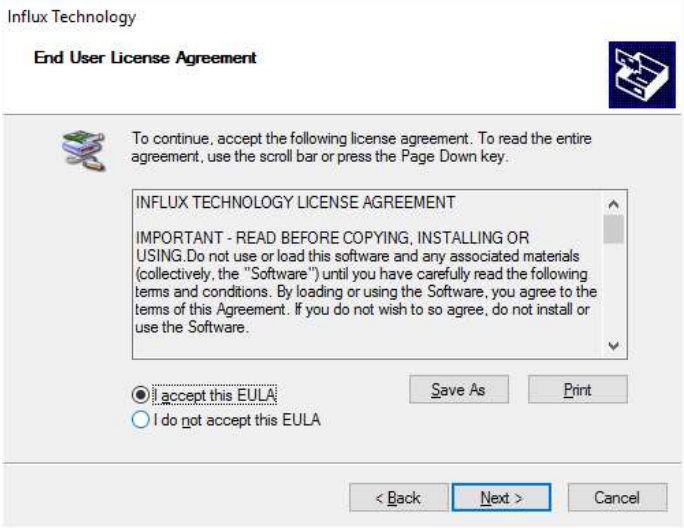
Once DiaLog has been successfully installed, the Rebel drivers must be correctly installed to ensure the Rebel functions correctly.

DiaLog installation automatically contains a driver installation application, which can be found in the Influx Technology folder of the Start Menu as shown below.

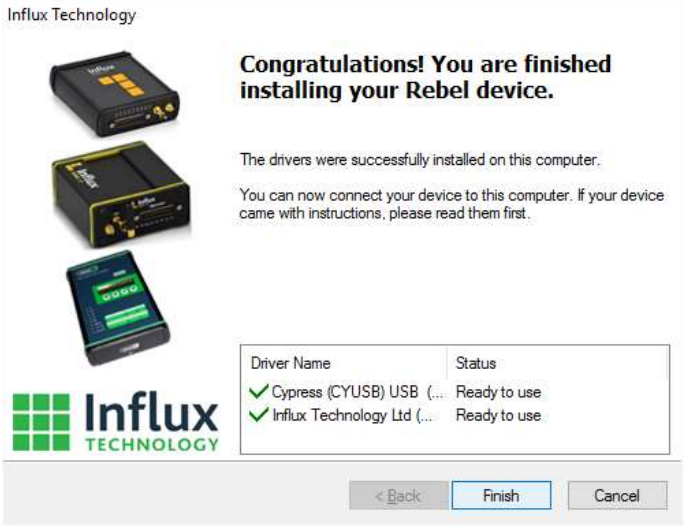


Ensure the Rebel is not plugged in and click ‘Next’ to continue.

Please read and accept the EULA, then click next to continue.



The driver installation will begin and may take a few moments.
Once the installation is complete, click ‘Finish’ to close the application.



Plug in the Rebel to allow the drivers to be recognised.

3.3—How to Connect to a Rebel Data Logger

The main function of DiaLog is the administration of the Rebel data logger. To begin using the Rebel data logger it must first be configured for the required data logging application. The first step is to establish a connection between the Rebel data logger and DiaLog.

The Rebel boasts a variety of connections and communication abilities, but the main interface between a Rebel and DiaLog is via a USB connection. The USB port may be located behind the protective flap on the end of data logger, as can be seen below. Note: Press firmly on the centre of hinge to release flap.

There are two states in which the Rebel can communicate via USB:
Limited Mode—In this state the Rebel is powered only by the USB connection. This allows quick and simple communication with the logger when a power source is not available. In this mode the user can retrieve data via USB and send new 'Configuration Structures' to the logger. The logger may have limited capability until fully powered up.
Full Powered—To achieve this state correctly the logger must powered via the Vehicle connection and also connected to a transmitting CAN bus to ensure it is fully awake. (Full details of setting sleep settings can be found in this document) In this mode all functionality is available. When a 'Configuration Structure' is sent to the logger, in this state the Rebel will immediately reconfigure. This state is also required for updating the logger firmware.

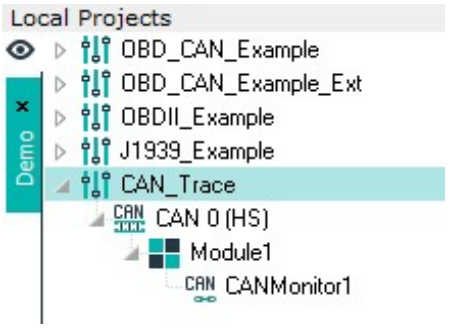
Once the required logger state has been chosen the Rebel can be connected to the computer.

1. Using the USB cable supplied, connect the Rebel to your computer's USB port.
2. DiaLog will automatically recognise the Rebel.
3. Once DiaLog has recognised the Rebel it will confirm the connection.

3.4—Local Projects

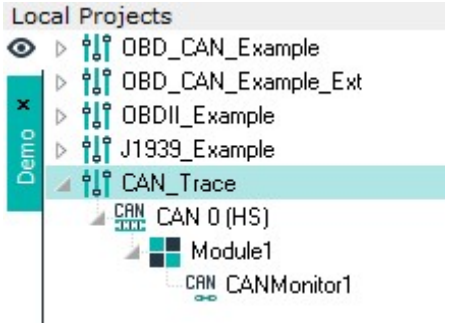
3.4.1—Introduction

The ‘Local Projects’ is the ‘Database’ tab of the ‘Database’ panel and is where all the configuration for data logging tasks is performed and stored. It is a powerful tool allowing the user to create an infinite variety of complex configurations to facilitate any data logging application.



3.4.2—Configuration Structure

The data logging process is based around creating configuration files which instruct the Rebel data logger to perform the required tasks. These constructs are known as a ‘Configuration Structure’ and are saved with their own dedicated file format. The structures are entirely user configurable and provide a very simple explicit procedure for configuring very complex tasks. A ‘Configuration Structure’ is built by the user in the ‘Local Projects’ panel where it is represented graphically as can be seen in the example below:

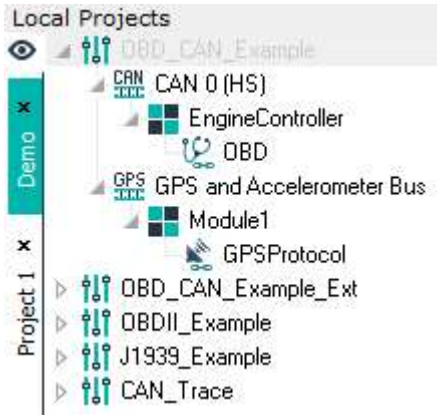


A structure is composed of a number of different components. These are: ‘Configuration’, ‘Bus’, ‘Module’, ‘Protocol’ and the ‘Data Items’ - more detail on each can be found in their relevant sections. Once a ‘Configuration Structure’ has been completed it is stored by the software as an .IVS file. The .IVS file is then imported in to the Rebel data logger which is used to configure it for the required task.

3.4.3—Recording On-Board Diagnostic Powertrain Data

DiaLog automatically loads with two pre-created ‘Configuration Structures’ stored in the ‘Local Projects’ in the ‘Demo’ tab. The purpose of these structures is to provide a simple tutorial to enable the user to very quickly configure the Rebel data logger to perform two common tasks.

The pre-loaded ‘OBD_CAN_Example’ ‘Configuration Structure’ can be seen below.



.The structure is designed to collect the emissions related powertrain data from any module which complies with the OBD legislative requirements using the Mode 0x01—Powertrain Diagnostic Data service.

As can be seen from the structure it is configured to collect the data using the High-Speed CAN bus. The structure also utilises the ISO 14229 diagnostic protocol standards to make it universally applicable to any compatible modules

The structure contains a number of generic Periodic Data Identifiers (PIDs), which can be seen in the ‘Data Items’ tab of the ‘Main’ panel.

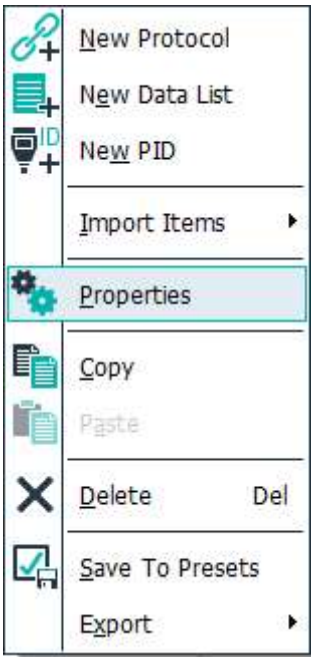
The Rebel will attempt to log the data for all of the PIDs. However, each module is different and may only support a subset of the data items. Any unsupported items will simply not be logged, without effecting the successful data logging of the remaining items. The ‘Data Items’ tab can be seen below with the pre-loaded PIDs.

No.	Rate	Stream	Label	Units	PID	Address	Size	Datatype
1	**1 Sec**	No	O2S11	V	0x14	0x00	2	Unsigned Byte
2	**1 Sec**	No	O2S12	V	0x15	0x00	2	Unsigned Byte
3	**1 Sec**	No	O2S13	V	0x16	0x00	2	Unsigned Byte
4	**1 Sec**	No	O2S22	V	0x19	0x00	2	Unsigned Byte
5	**1 Sec**	No	SHRTFT1	%	0x06	0x00	1	Unsigned Byte
6	**1 Sec**	No	SHRTFT11	%	0x14	0x00	2	Unsigned Byte
7	**1 Sec**	No	SHRTFT12	%	0x15	0x00	2	Unsigned Byte
8	**1 Sec**	No	SHRTFT13	%	0x16	0x00	2	Unsigned Byte
9	**1 Sec**	No	SHRTFT22	%	0x19	0x00	2	Unsigned Byte
10	**1 Sec**	No	PTO_STAT	-	0x1E	0x00	1	Unsigned Byte
11	2 Sec	No	CATEMP12	degC	0x3E	0x00	2	Unsigned Word
12	2 Sec	No	IAT	deg	0x0F	0x00	1	Unsigned Byte
13	2 Sec	No	ECT	degC	0x05	0x00	1	Unsigned Byte
14	2 Sec	No	AAT	degC	0x46	0x00	1	Unsigned Byte
15	2 Sec	No	CATEMP11	degC	0x3C	0x00	2	Unsigned Word
16	5 Sec	No	EGR_ERR	%	0x2D	0x00	1	Unsigned Byte
17	5 Sec	No	CATEMP21	°C	0x3D	0x00	2	Unsigned Word
18	5 Sec	No	EVAP_VP	Pa	0x32	0x00	2	Signed Word
19	5 Sec	No	CATEMP22	°C	0x3F	0x00	2	Unsigned Word
20	10 Sec	No	AIR_STAT: OFF		0x12	0x00	1	Bitfield

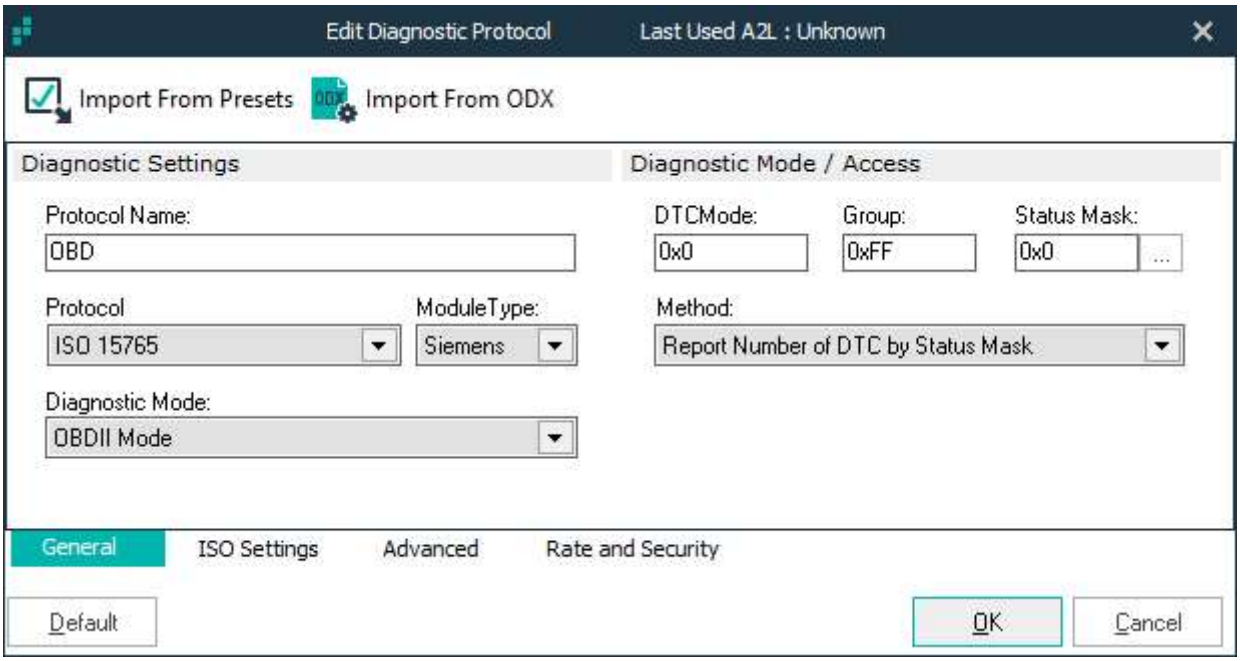
Properties | Items | PC Explorer

The ‘Configuration Structure’ is configured to a generic ‘OBDII’ setting designed to work on the majority of OBD compliant vehicles. However, the structure can be manually configured for the specific module to be data logged to ensure success. In this case the module manufacturer should be identified and the appropriate settings chosen. To do this the ‘Protocol’ must be edited and this can be seen below.

To edit the ‘Protocol’ in this case called ‘OBD’, highlight the ‘Protocol’ and either use the ‘right click’ menu shown below.



The ‘Properties’ menu opens ‘Edit Diagnostic Protocol’ window as shown below.

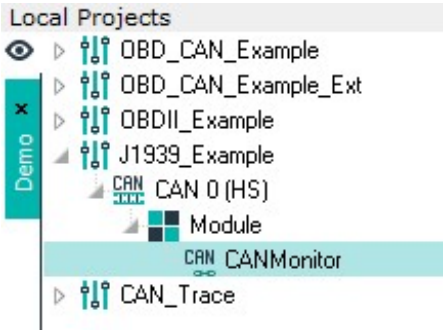


The window contains a number of different settings, however, here we are concerned with the ‘Module Type’ and ‘Protocol’ settings. These allow the selection of the module manufacturer and the required ‘CAN Protocol’ from drop-down menus. Once the required settings have been chosen click ‘OK’ to confirm the changes and close the window.

The ‘Configuration Structure’ is now ready for use.

3.4.4—Recording J1939 Broadcast Data

The second ‘Configuration Structure’ which comes pre-loaded in the ‘Demo’ tab with DiaLog is designed to collect a sample set of the J1939 broadcast CAN data available on any J1939 bus.



The structure utilises the ‘CAN Monitor’ protocol to listen to and capture specific signals from the bus.

The structure is loaded with a sample set of signals, designed to demonstrate the ability to record J1939 data. Each J1939 bus is unique may not support every signal. A large array of further signals are also available from the bus and these can be added using a suitable DBC file

The J1939 signal items loaded in the structure can be seen in the ‘Items’ panel as shown below.

No.	Stream	Label	Units	Rx Ident	Message Name	Start Bit	Bit Co
1	No		L			0	32
2	No		L			32	32
3	No		km/hr			48	16
4	No		km/h			0	8
5	No		km/h			48	16
6	No		rpm			32	16
7	No					30	2
8	No					14	2
9	No					6	2
10	No		%			56	8
11	No					48	4
12	No					40	8
13	No		rpm			24	16
14	No		%			16	8
15	No		%			8	8
16	No		%			4	4
17	No					0	4
18	No		%			56	8
19	No		%			48	8
20	No					46	2

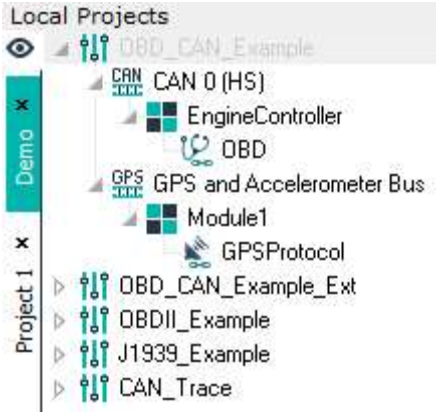
Properties | Items | PC Explorer

The ‘Configuration Structure’ is now ready for use.

3.5—Rebel Configuration

3.5.1—Introduction

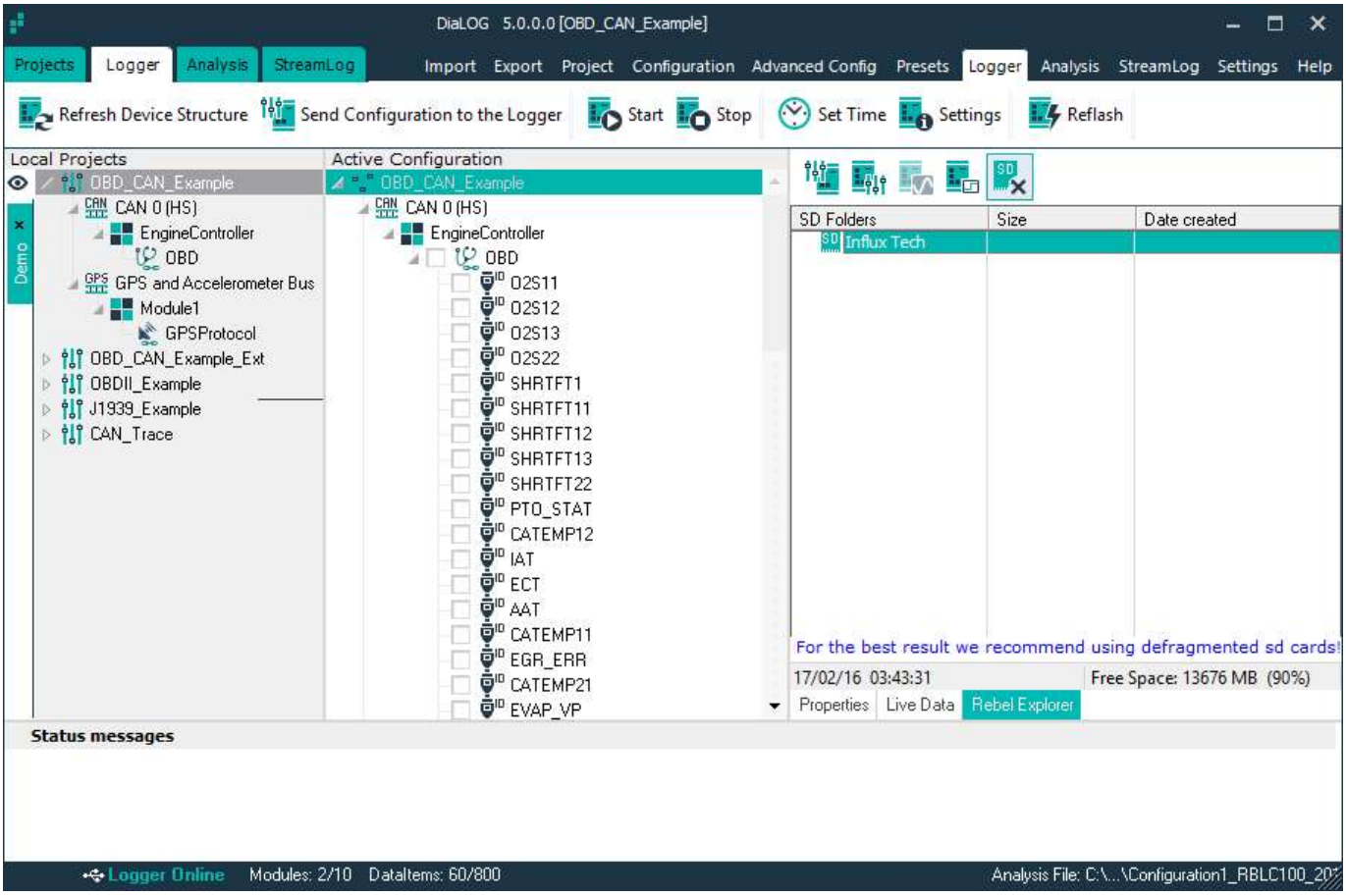
Once the required ‘Configuration Structure’ has been completed, it is ready to be utilised in the Rebel data logger for the required task. In the case of the pre-loaded ‘OBD_CAN_Example’ the structure is configured to collect a number of PIDs using Mode 0x01, this example is considered here. However, the process is identical for all ‘Configuration Structures’.



There are two ways to configure the Rebel data logger, the first is by direct connection to the Rebel and the second involves uploading directly to an SD card.

Warning:

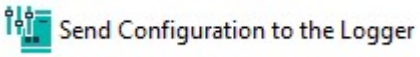
All new SD cards must be formatted in the Rebel prior to use. This is performed from the Logger Tab by clicking on Rebel Explorer and Clicking the Format SD Card Icon 



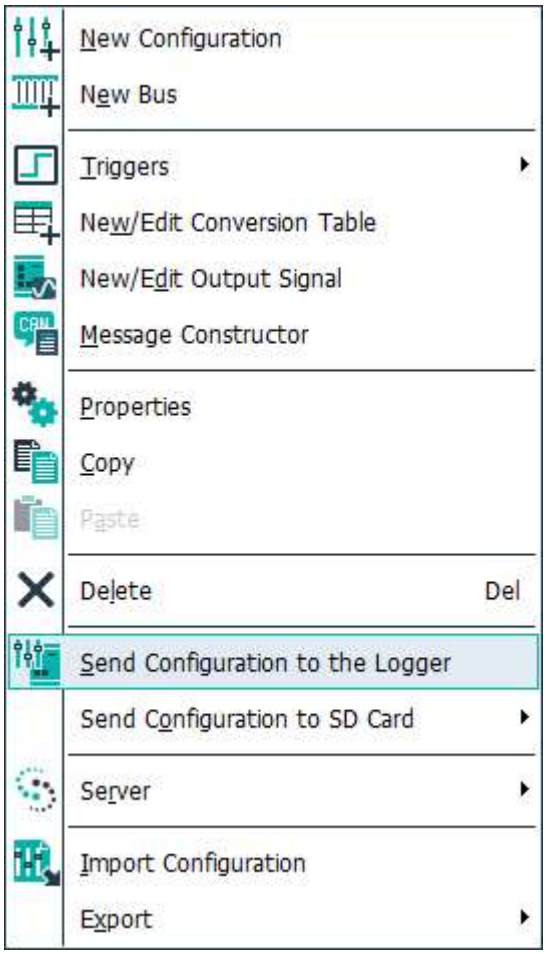
3.5.2—Uploading a Configuration Structure to a Rebel Data Logger

The first step is to ensure the Rebel is connected and ready to be configured. The next step is to ‘Send the Configuration to the logger’.

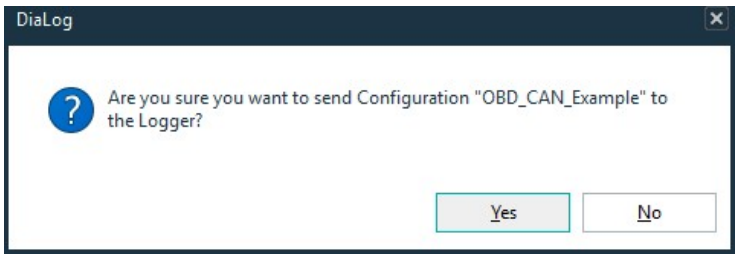
Ensuring the required ‘Configuration Structure’ is selected in the ‘Local Projects’ panel, there are two ways of uploading the ’Configuration Structure’. The first is the ‘Send Configuration to the Logger’ toolbar icon.



The second is through the ‘right click’ menu for the ‘Configuration’ in the ‘Local Projects’ panel, as shown below.

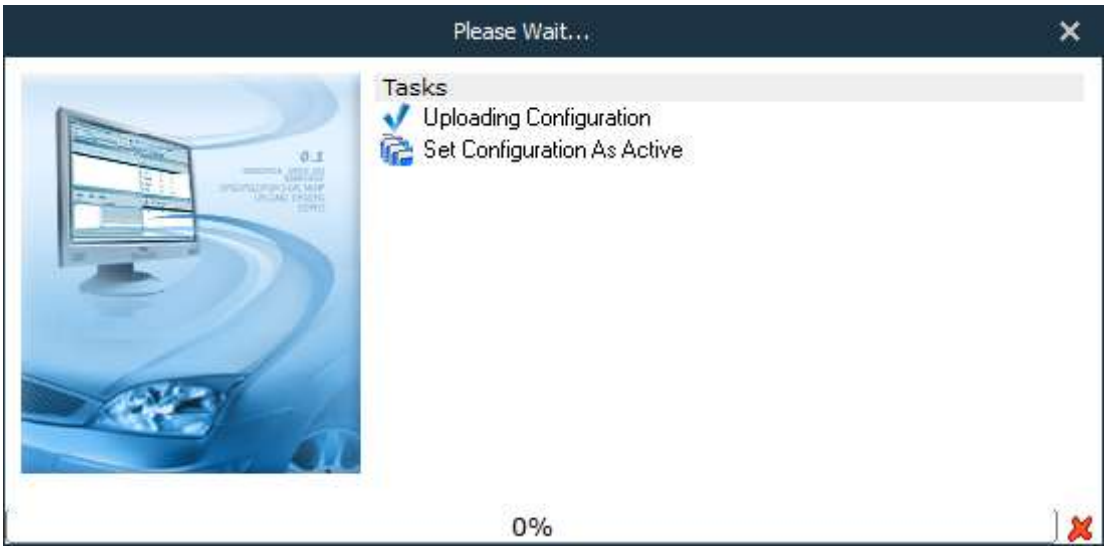


Here the ‘Send vehicle file to the Logger’ menu item is required. Once DiaLog has been instructed to send the required ‘Configuration Structure’ to the data logger the ’Confirmation’ window will appear, as shown below.



This window is a precautionary measure to ensure the logger is not accidentally reconfigured, as doing so stops the current ‘Configuration Structure’ from being the active structure on the Rebel data logger.

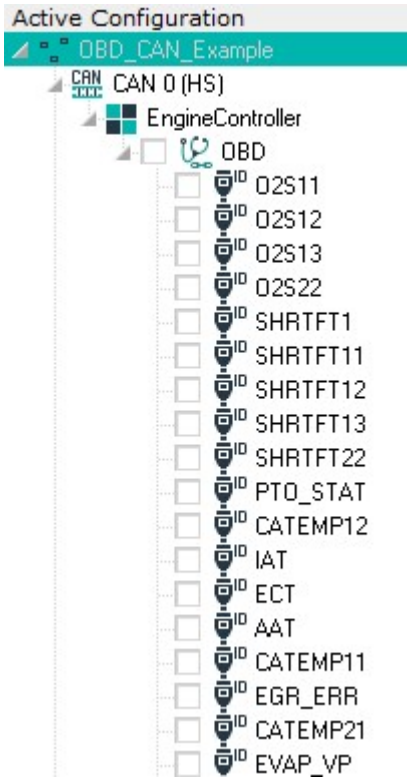
To continue the upload of the 'Configuration Structure' to the Rebel data logger, click 'Yes'. This will begin the process and the 'Progress' window will appear as shown below.



Once DiaLog has completed the upload to the Rebel the 'Progress' window will automatically close. If you wish to 'Stop' the sending of the 'Configuration Structure' during the upload process the 'red cross' can be used, in this instance the Rebel will be left with no active 'Configuration Structure'.

When a new 'Configuration Structure' is uploaded to a Rebel data logger it is automatically set as the active structure. This means that any 'Configuration Structure' present on the Rebel will remain deactivated and not be used for data logging.

With the structure loaded to the Rebel, the 'Active Configuration' panel will automatically update to display the current active 'Configuration Structure' as can be seen below.



The Rebel now contains a valid 'Configuration Structure' and is ready to begin data logging the required task.

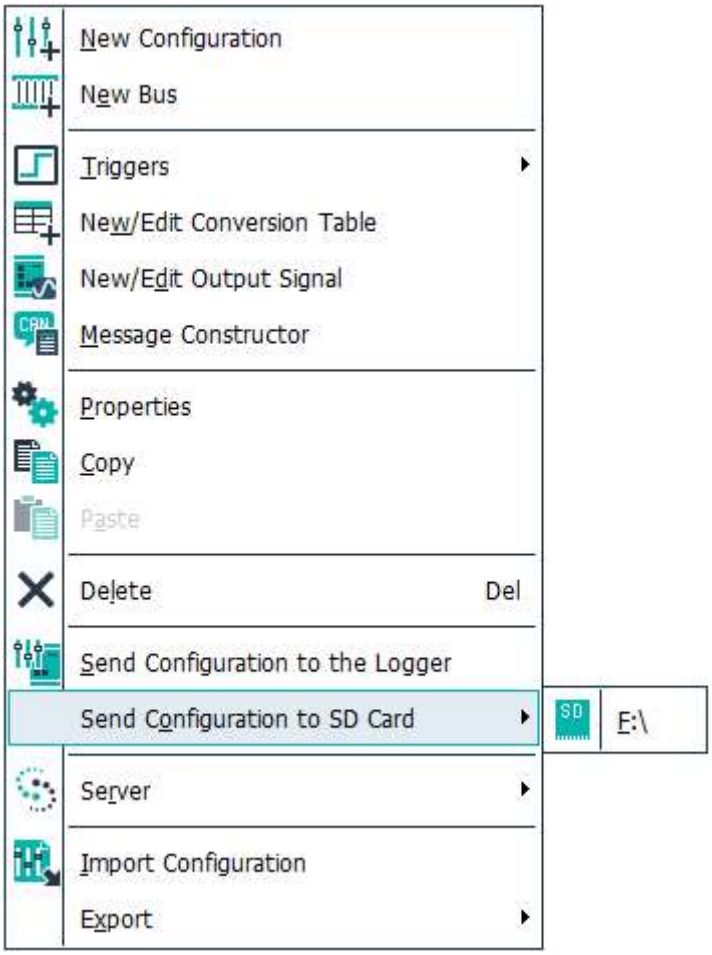
Upon connecting the Rebel to a vehicle it will automatically reconfigure itself using the new 'Configuration Structure' and begin data logging.

Note:

Configuration Structure priorities between the Rebel and SD card—An active structure on an SD card will always take priority over the Rebel. However, if a blank SD card is inserted into a Rebel with a structure on-board this will automatically be loaded to the SD card.

3.5.3—Uploading a Configuration Structure to a SD Card

The second method involves directly uploading the 'Configuration Structure' to an SD card. Insert the SD card to be used in the Rebel into the PC's SD card reader. The upload is performed using the 'SD Card' window accessed either using the 'right click' functionality on the Configuration in the Projects Tab as shown below or by using the Set Configuration to SD button on the PC Explorer Tab.



This ability to independently load the required 'Configuration Structure' to the SD card allows Rebel data loggers to be remotely configured using pre-prepared SD cards. When an SD card containing a 'Configuration Structure' is inserted in to a Rebel it will automatically reconfigure itself using the 'Configuration Structure' on the SD card. If there is more than one structure present the Rebel device will configure itself using the 'Configuration Structure' currently set to active.

Influx Technology recommends the use of SanDisk SD cards to ensure reliable performance. The SD cards recommended for use with the Rebel are:

SanDisk Ultra 2GB-64GB

Alternative cards should work, but are not tested.

Note:

Configuration Structure priorities between the Rebel and SD card—An active structure on an SD card will always take priority over the Rebel. However, if a blank SD card is inserted into a Rebel with a structure on-board this will automatically be loaded to the SD card.

3.6—Rebel Data Logging

3.6.1—Connecting a Rebel Data Logger to a Vehicle/Module

Once the 'Configuration Structure' has been created and uploaded the Rebel is ready to be used for data logging. The first step is to connect the Rebel to the vehicle or module to be data logged.

The Rebel contains a number of different connection options; the current 'Configuration Structure' determining which are required for each application. The Rebel logging connections are considered below.

Main Vehicle Connection—Usually D-type connector contains a number of vehicle connections including: CAN 0 (HS), CAN 1 (MS), LIN and K-Line.

Analogue and Digital Channels and or connection for H Box external instrumentation (If installed)

With the correct connection established between the Rebel and the vehicle/module, the vehicle/module can be powered up for data logging to begin.

Upon powering up, the Rebel will automatically wake on the CAN Bus activity (Dependent on the Sleep Mode Setting). Each time a new 'Configuration Structure' is uploaded or set as the active structure (or an SD Card containing a new 'Configuration Structure' inserted), on the first Rebel power up it will automatically use the new 'Configuration Structure' to reconfigure itself.

The reason for this process is to fully configure and prepare the Rebel for the data logging task, e.g. creating any required DAQ lists. This process may vary in length with the complexity of the 'Configuration Structure'. However, it is a one time process for a new structure and ensures on each subsequent power up, the Rebel is prepared to immediately begin data logging.

3.6.2—Data Logging

Once the Rebel data logger has completed reconfiguring itself it is ready to begin. With the correct vehicle/module connection established the Rebel will begin to data log immediately.

The front panel also contains a number of LEDs intended to inform the user of the logger status. The LEDs are user programmable but unless specified operate in the default mode:

F1. CAN 1 (MS) Bus traffic.
F2. Data Logger is configured and ready.
F3. Instrumentation/Trigger status.
F4. GPS status—flashes when acquiring data.
F5. CAN 0 (HS) Bus traffic.
Status. On—waiting, Flashing—ready
Connect. On—connected, Flashing—activity
SD Card. On– connected, Flashing—activity

3.7—Data Retrieval and Analysis

The Rebel is capable of collecting a large amount of data from an array of sources, utilising a number of methods simultaneously. Once the required data has been logged to the Rebel, for this example a number of Mode 0x01 PIDs, it needs to be retrieved from the Rebel data logger in order to be analysed.

3.7.1—Retrieving Recorded Data from a Rebel Data Logger

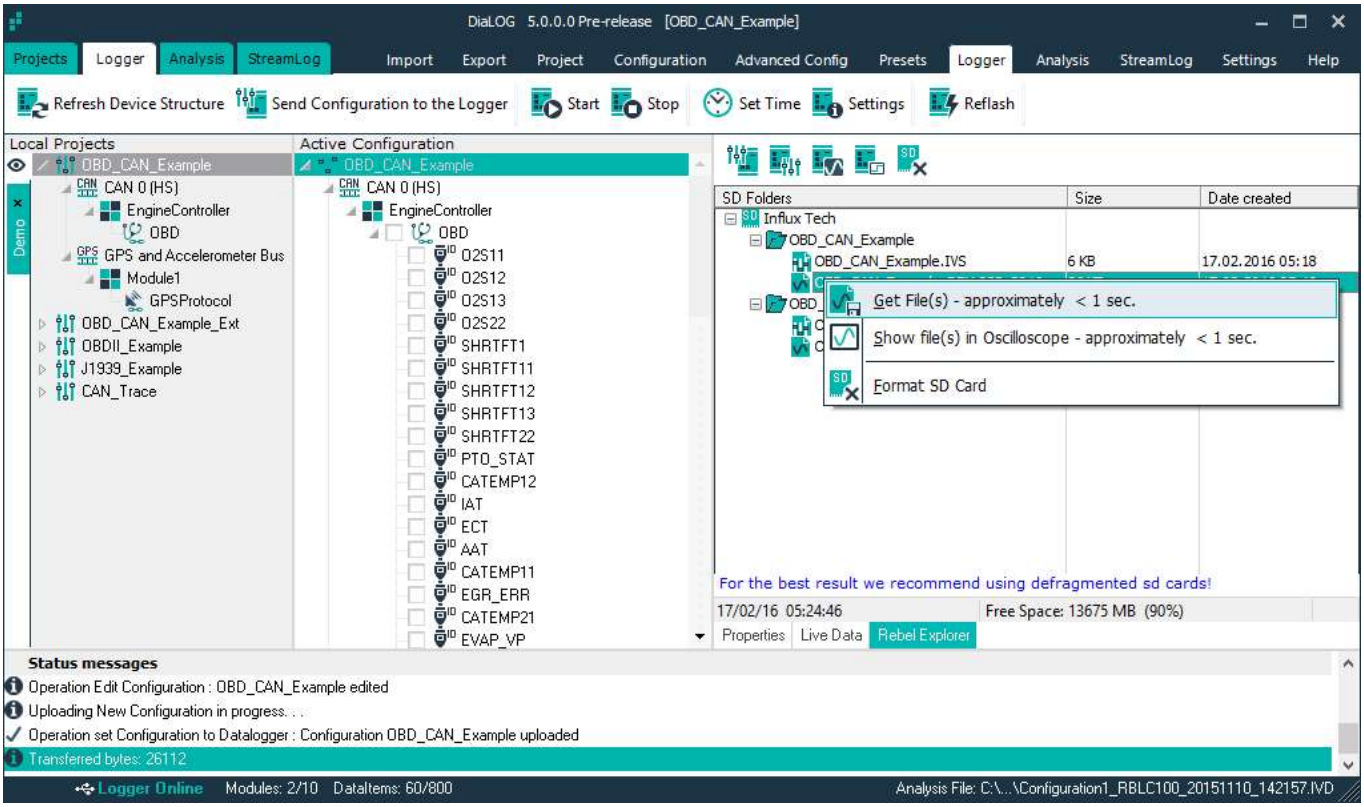
The procedure for retrieving the data from the Rebel is very simple and there are a number of options for achieving this. The first and most common method, utilises DiaLog to download the required data directly from the Rebel. Simply navigate to the Logger Tab, select the Rebel Explorer, with the Rebel connected and 'Online' with Dialog, the 'Rebel' window opens as shown below.

The Rebel Explore displays all the files currently stored on the Rebel in associated 'Configuration Structure' folders. To retrieve the data logged using this structure, click the 'expansion' icon to display the files related to the required structure.

Here the tree lists two file types, the first is an .IVS file which is the 'Configuration Structure'. The second is an .IVD file, which is a data file, containing all the recorded data from a single logging session. A session being each time the Rebel power cycles, normally with the power on and off of the vehicle/module.

The data files are named in the format: configuration name_rebel name_YYYYMMDD_HHMMSS.IVD to ensure each data file is unique.

To retrieve the data file(s) from the logger, 'right click' on the selected data file(s) to display the menu shown below.

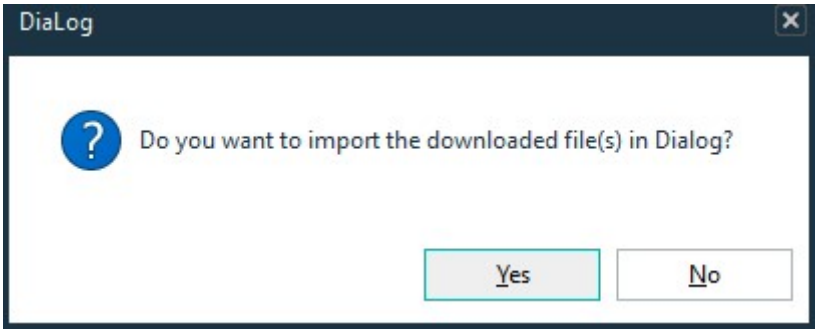


Clicking 'Get File(s)' will begin the download of data file(s) on to the user's computer. As can be seen there is an approximated download time for the file(s).

Upon clicking 'Get File(s)' the software requests the user to select the desired location to save the data file.

The 'Progress' window will then appear displaying the download completion for the data file(s). Once DiaLog has completed the download of the data file from the Rebel the 'Progress' window will automatically close. If you wish to 'Stop' the download of the data file during the process the 'red cross' can be used. In this instance a partial data file will be stored, however the file will remain unaffected on the Rebel device.

With the completion of the download the Dialog software will display a prompt asking if the user requires the data file to be automatically imported into DiaLog, as can be seen below.

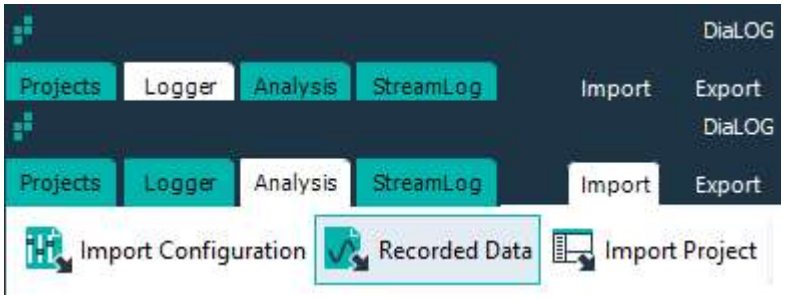


- Yes—Imports the data file into the 'Recording Analysis' tab of the 'Database' panel.
- No— The file has been saved to the computer; however it will not be imported into the software at this time.

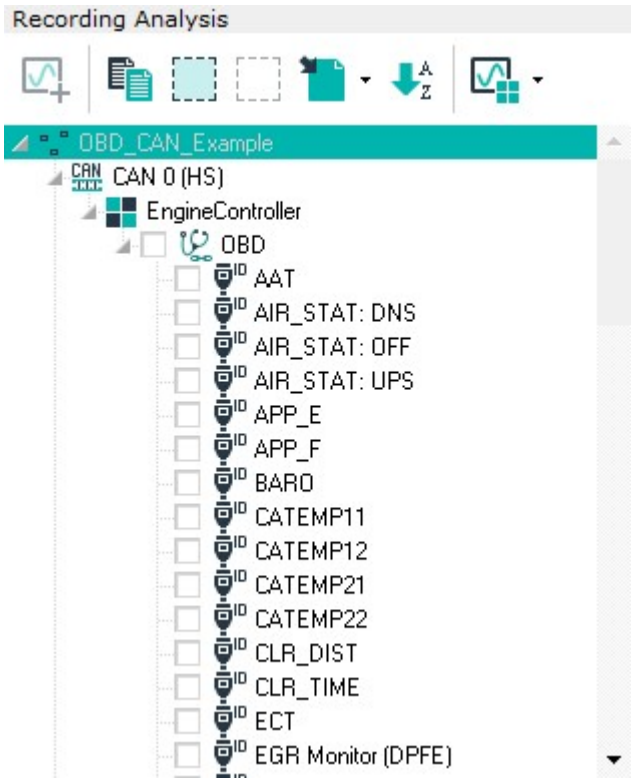
The second method for retrieving the logged data, is to manually obtain them directly from the SD card. The Rebel writes directly into FAT32 format on the SD card which allows direct access to the cards through your operating system. The retrieval then becomes as simple as locating the required .IVD file on the SD card and saving it to your system. The file can then be imported into the DiaLog software for data analysis and subsequently exported in a number of file types for external analysis.

3.7.2—Data Analysis

Once data files have been retrieved from the Rebel they can be imported into DiaLog to be analysed. This can either be done automatically on retrieving the data file, or manually by the user. Data files are manually imported into DiaLog using the Import Recorded Data Functionality.



Select the required .IVD data file in the 'Open' window and click 'OK' to import in to the 'Recording Analysis' panel as shown below.

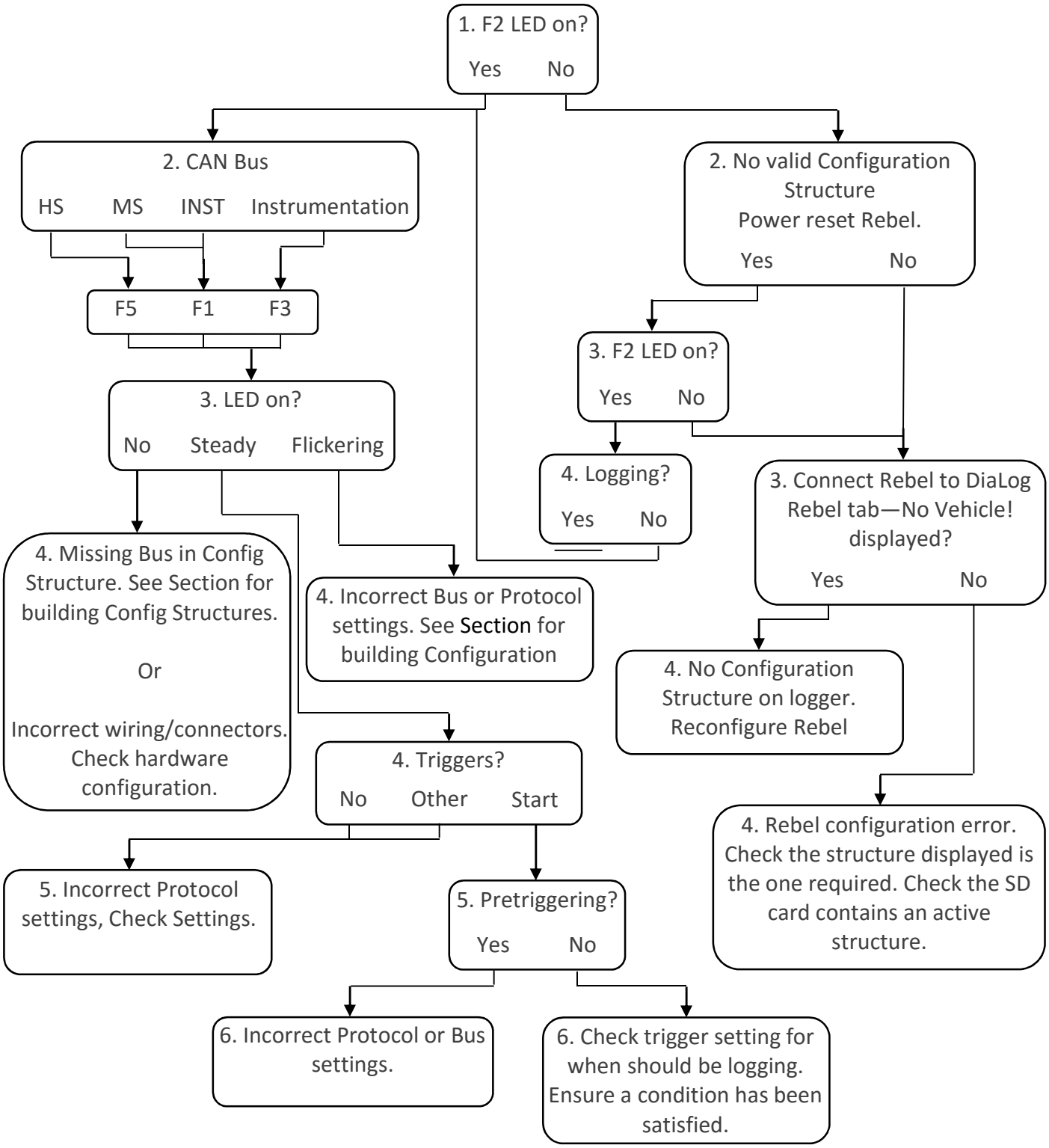


As can be seen the recorded data is displayed in the same format as the 'Configuration Structure' utilised in its capture. In this instance the recorded data is in the form of a number of PIDs captured using Mode 0x01.

3.8—Rebel Trouble Shooting

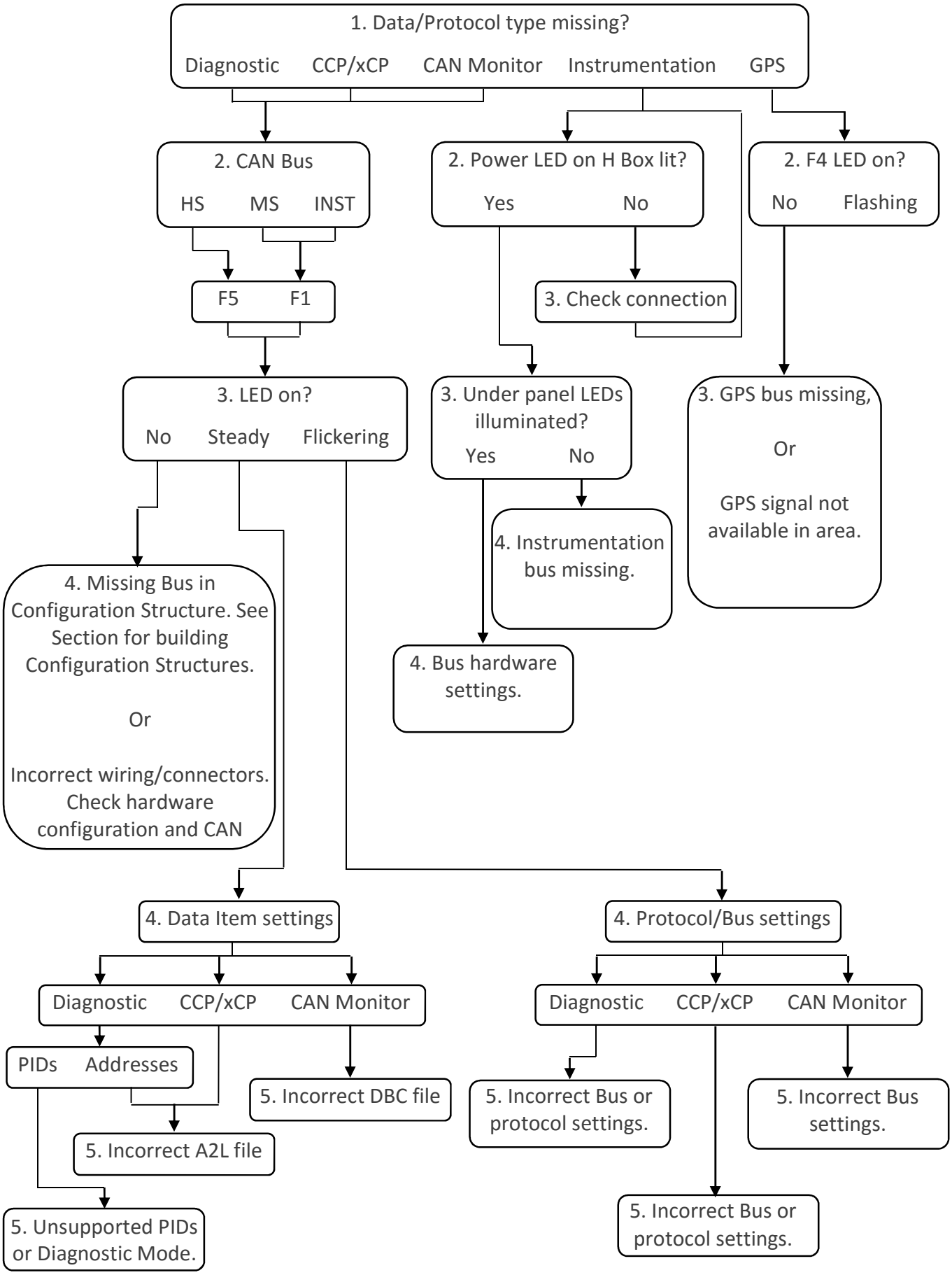
3.8.1—Rebel Not Logging

This trouble shooting guide runs through the diagnosis of possible problems if the Rebel is not logging when expected. The Rebel can be determined to be not logging by the absence of 'Logging' on the LCD and no flickering of the SD LED indicating no writing to the SD card.



3.8.2—Incorrect Data Records

This trouble shooting guide runs through the diagnosis of possible reasons for data records missing from IVDs or not logging when expected.



3.9—Frequently Asked Questions

This section covers a number of common tasks and questions for using DiaLog and the Rebel data logger.

3.9.1—How to interpret the Rebel Status LEDs

- F1. CAN 1 (MS) / INST bus traffic - Flash-searching, Steady-connected. If a connection is not established, please check the bus is correctly configured for baud rate, protocol and data items.
- F2. On - Valid configuration. If not lit try power cycling the Rebel and check there is an active structure on the SD card.
- F3. Instrumentation board active. Indicates the Instrumentation bus has been configured on the structure.
- F4. GPS status - flashes slowly when acquiring data. If not flashing please check the bus is configured on the structure and antenna is correctly connected.
- F5. CAN 0 (HS) bus traffic - Flash-searching, Steady-connected. If a connection is not established, please check the bus is correctly configured for baud rate, protocol and data items.
- Status. On-waiting, Flash-ready.
- Connect. On-connected, Flash-communicating.
- SD Card. On-connected, Flash-writing to card.

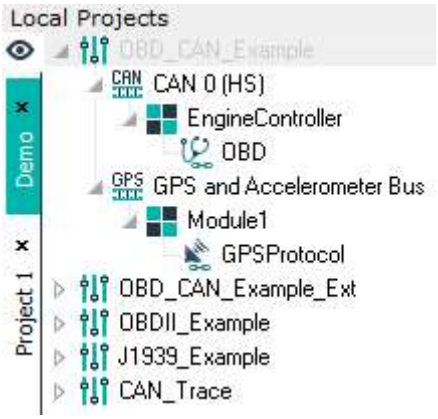
3.9.2—How to open the flap and access the SD card and USB Connection on IP65 Loggers

Press firmly down on the top of the hinge of the flap.
While maintaining a suitable pressure to release the catch, swing the bottom of the flap forwards.
Please note: While a firm pressure is required to open the flap, excessive force will cause damage to the hinge.

3.9.3— How to configure the data logger

The Rebel data logger can be configured using either the USB connection or a prepared SD card.
Configuration via USB:
1. Open DiaLog and connect the Rebel to your computer via USB port.

2. Highlight the required Configuration Structure in the Local Projects by clicking on the name.



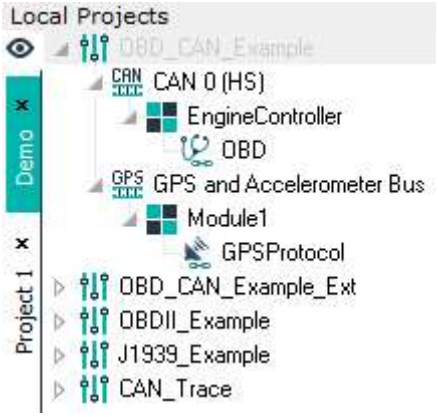
3. Use the right-click menu ‘Send Configuration to the logger’ option to send to the Rebel. This writes the configuration structure to the SD card as the ‘active structure’.

4. If the Rebel is fully powered, or if only powered by USB when next fully powered, the Rebel will reconfigure itself to the new structure.

Configuration via SD card:

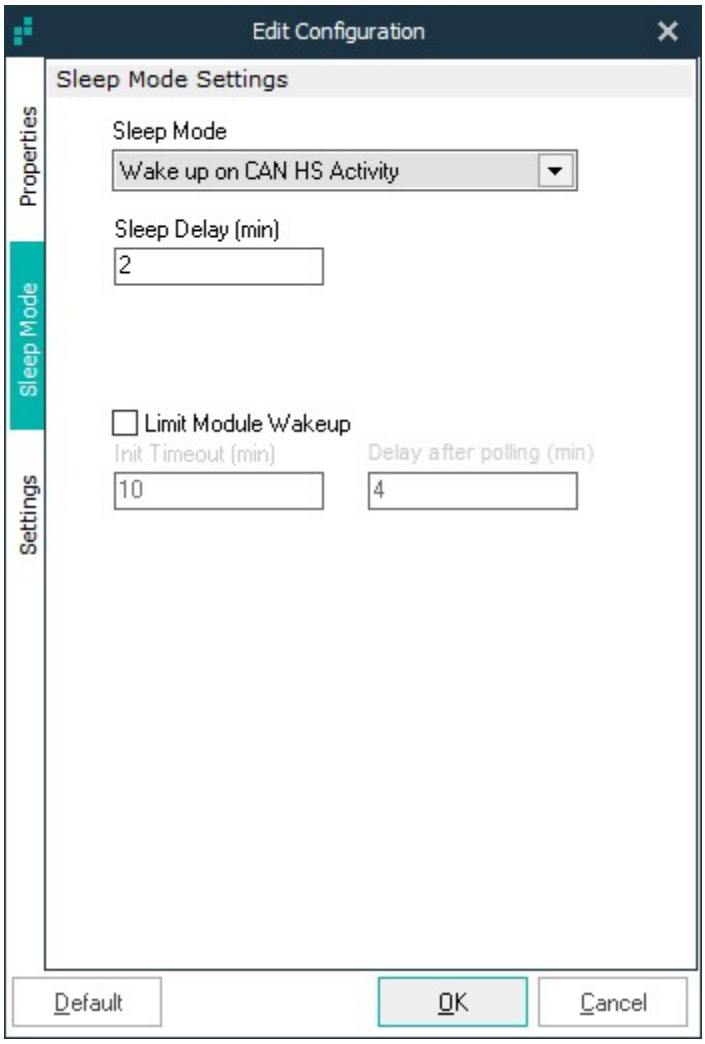
1. Open DiaLog and insert the SD card into the computer’s reader.

2. Highlight the required configuration structure in the Local Projects by clicking on the name.



3. Use the right-click menu 'Send Configuration to SD Card' option to send to the SD Card. This writes the configuration structure to the SD card as the 'active structure'.

3.9.4—How to set the logger sleep modes



Each Configuration Structure allows the user to determine the sleep settings for the logger.

- Select the configuration structure.
- Click 'Properties'.
- Select the 'Sleep Mode' tab.

Sleep mode settings:

Sleep mode - determines the method in which the logger will wake.

- Wake on HS bus activity
- Wake on MS bus activity
- Wake on Inst bus activity
- Wake on HS or MS bus activity
- Wake on Alarm 1
- Power down mode - this enters the logger into a deep sleep using <3mA.

Sleep Delay - specifies the delay before the logger sleeps.

Additional Option

- Limit Module Wakeup
- Init Timeout - Enters the logger into a silent mode (no polling) after the specified time.
- Delay after polling - Forces the logger to 'remain silent' even if traffic is present on the bus. This allows the vehicle to sleep.

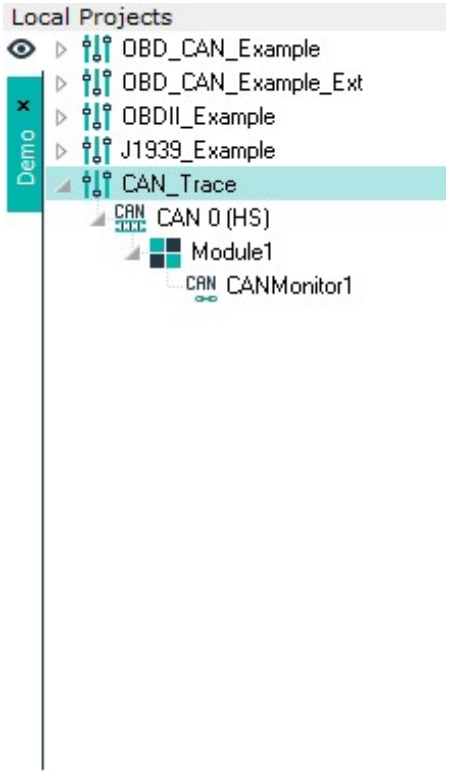
4—Local Projects

4.1—Introduction

The ‘Local Projects’ panel is fundamental to the configuration of the Rebel. It allows the user to build a completely custom ‘Configuration Structure’ to enable the Rebel to perform innumerable complex tasks.

4.2—Project

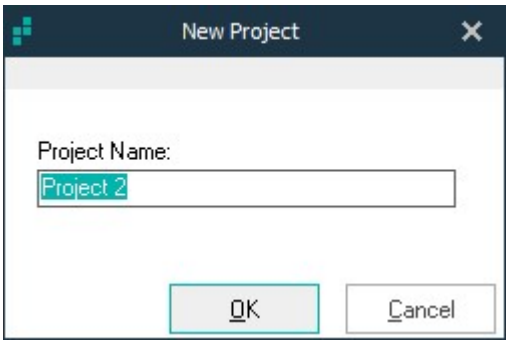
The ‘Local Projects’ panel found on the left of the screen is the ‘Projects’ tab of the ‘Database’ panel and can be seen below.



This section will explore the functionality of the ‘Local Projects’ panel, the main features being the creation and administration of configurations for any data logging application. The ‘Configuration Structure’ created contains the required configuration information and is constructed from a number of components, each of which allows an array of options.

The different stages of construction of a ‘Configuration Structure’ are explored in a clear, stepwise fashion. Highlighting the available options at each stage, making it simple for the user to produce a configuration for the most complex of data logging tasks.

New Project—Allows the creation of a new ‘Project’, which will be represented by a new tab in the ‘Local Projects’. A ‘Project’ can also be created using the ‘New Project’ icon. DiaLog will prompt you to select a ‘Project’ name, as seen below.



- Edit Project—Re-opens the ‘Project Name’ window to allow the editing of the ‘Project’ name.
- Delete Project—Allows the deletion of the entire selected ‘Project’ tab, which is the open tab in the ‘Local Projects’ panel.
- Import Project—Enables the import of a .DPV ‘Project’ file into the DiaLog software. The file includes all ‘Configuration Structures’ within the ‘Project’.
- Export Project—Enables the export of the current selected ‘Project’ as a .DPV file for external storage purposes or transfer between software copies

4.3—Configuration Structure

Once a ‘Project’ has been created, the ‘Local Projects’ is ready to begin creating a ‘Configuration Structure’. A ‘Configuration Structure’ is the structure which contains all the configuration settings to instruct and set up the Rebel for the desired application. A ‘Configuration Structure’ is a configuration file and is stored as an .IVS file.

A ‘Configuration Structure’ is created from a number of specific components. They are purposefully designed to be analogous to the physical set up, allowing the intuitive creation of structures capable of configuring the Rebel for even the most complex applications.

A simple example structure can be seen below, each of the individual components are considered in order below.

Configuration

The ‘Configuration’ is the base building block for the ‘Configuration Structure’ and represents the vehicle to be data logged. As such it contains both a number of general details for the vehicle and configuration settings for the Rebel data logger.

Communication Bus

The ‘Bus’ directly designates the physical connection to the module to be used by the Rebel during data logging. Multiple ‘Buses’ may be included in one configuration and each contain a number of settings pertaining to the physical equivalent.

Module

The ‘Module’ represents an individual module/ECU within a vehicle, with up to 5 modules permitted per ‘Configuration Structure’ across all ‘Buses’.

Protocol

The ‘Protocol’ determines the communication method to be utilised by the logger to interact with the module. As such the ‘Protocol’ contains a number of settings pertaining to the communication for the module to be logged.

No.	Rate	Stream	Label
1	**10 Sec**	No	EQ_RAT
2	100 mSec	No	EGR_PCT
3	100 mSec	No	LOAD_ABS
4	100 mSec	No	TAC_PCT
5	60 Sec	No	MIL_TIME
6	60 Sec	No	FUELSYS2
7	60 Sec	No	FUELSYS1
8	60 Sec	No	CLR_TIME
9	30 Sec	No	VPWR
10	30 Sec	No	MIL_DIST
11	30 Sec	No	EGR Monitor (DPFE)
12	30 Sec	No	CLR_DIST
13	**10 Sec**	No	WARM_UPS
14	1 Sec	No	O2S11

Properties | Items | PC Explorer

Data Items

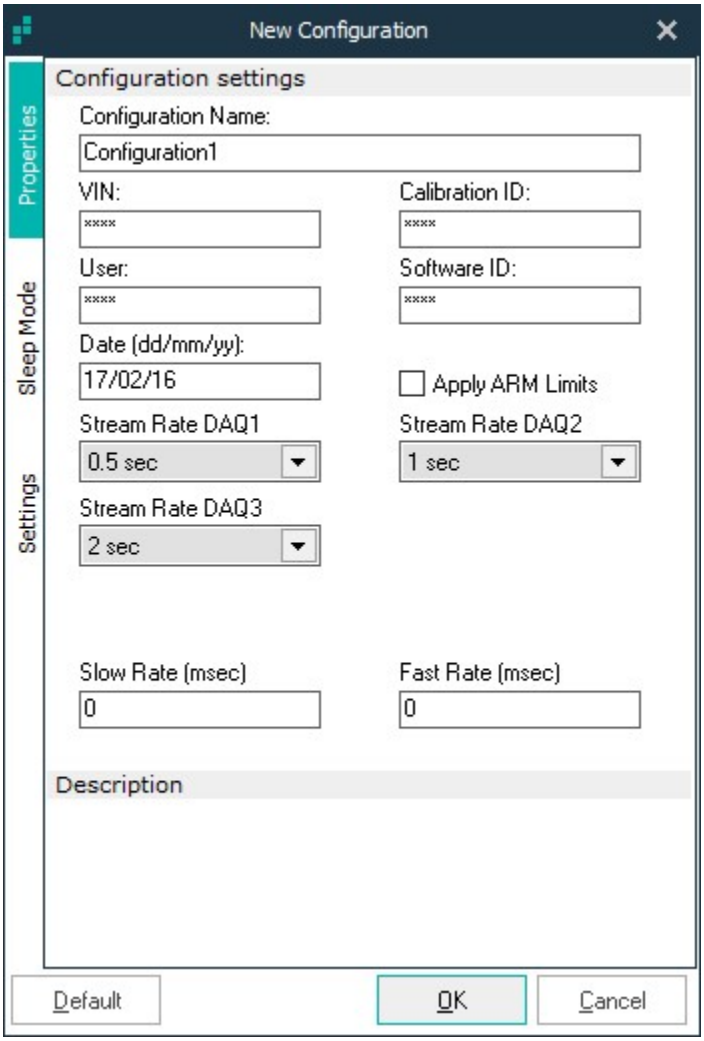
The ‘Data Items’ denote the individual items to be recorded and can include a large array of possibilities depending on the above configuration settings

4.4—Vehicle

The first step in creating a ‘Configuration Structure’ is to create a ‘Configuration’. A ‘Configuration’ allows you to specify a number of settings for not only the configuration to be data logged, but also the Rebel data logger for this task. It is effectively the base building block of a ‘Configuration Structure’ and allows the designation of a number of general settings.

To create a new ‘Configuration’ either the ‘New Configuration’ toolbar icon or right click in the Project Tree and Select New Configuration

Upon creating a new ‘Configuration’ the ‘Configuration Settings’ window will appear as shown below. The window opens on the ‘Properties’ tab as default.



Configuration settings:

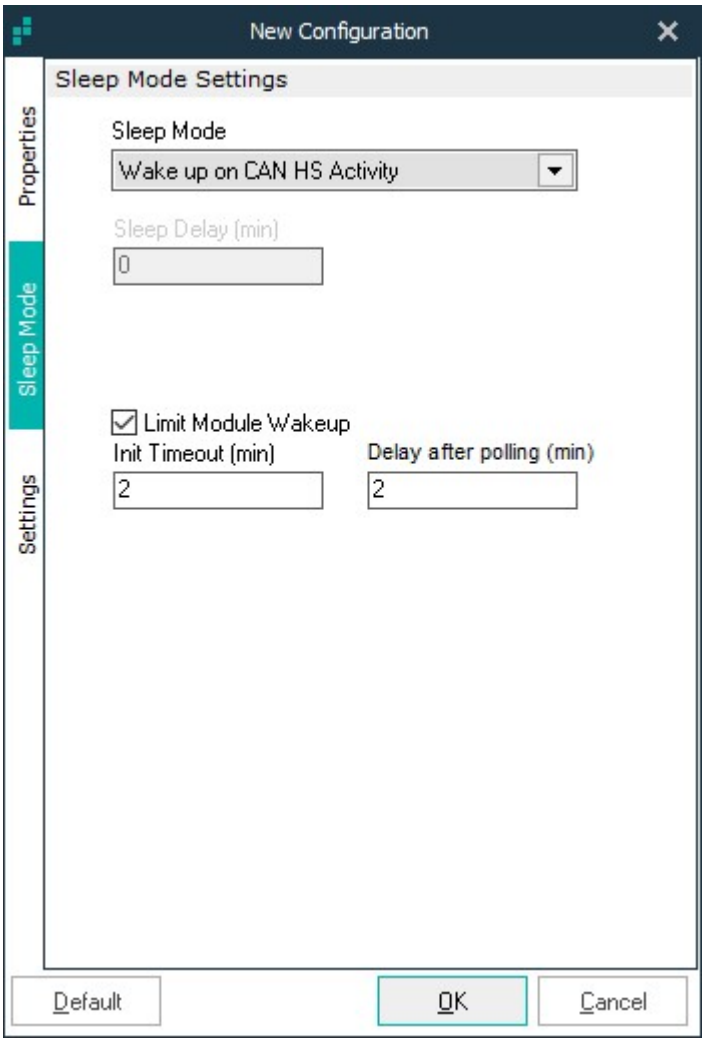
- Configuration Name—Allows the naming of the ‘Configuration’ item.
- VIN—Allows the user to specify a Vehicle Identification Number.
- Calibration ID—Allows the user to specify the calibration of the vehicle.
- User—Designates the current user/creator of the ‘Configuration Structure’.
- Software ID— Allows the user to specify the module software.
- Date—Allows the user to specify a date for the ‘Configuration Structure’, DiaLog automatically enters the days date, but it is editable to user requirements.
- Apply ARM Limits—Allows the user to extend the logging capabilities to fully utilise the ARM processors capabilities.
- Stream Rate—Allows the user to select the stream rate for each ‘Stream Data’ DAQ list. (StreamLog functionality.)

Logger settings:

- Logger Type—Drop down menu selects from a number of logger sampling options.
- Logger Mode—Drop down menu selects from a number of logger operational modes.

The window also contains a default button which allows all settings to be automatically returned to their original states.

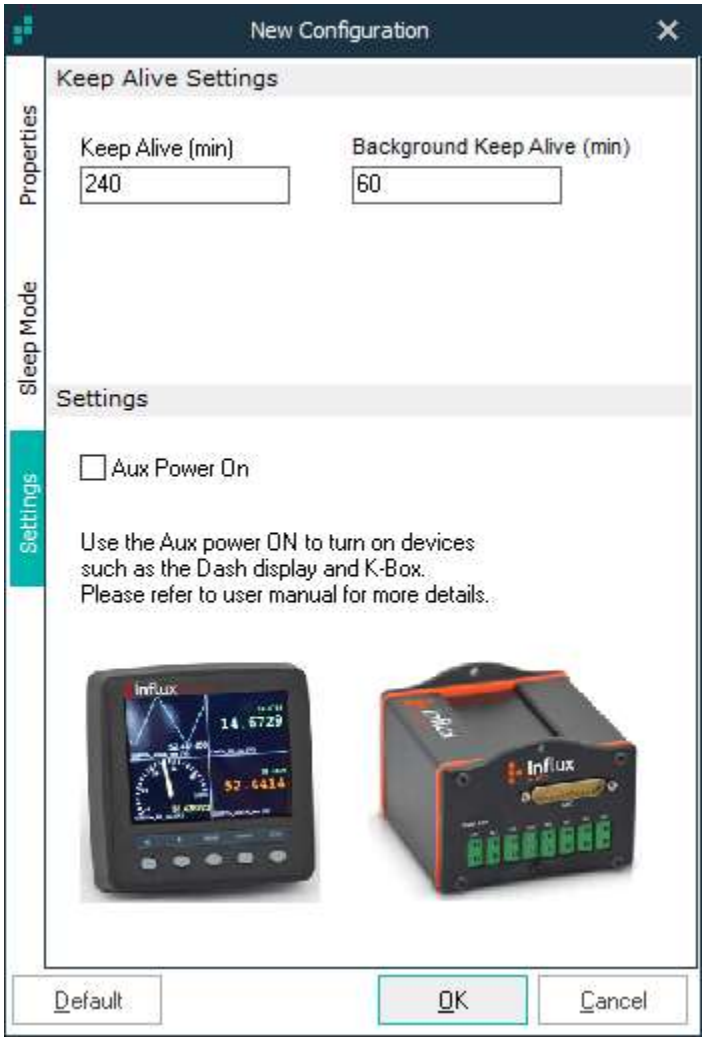
Sleep Mode Tab



Sleep Mode Settings:
Sleep Mode—Drop down menu selects the sleep mode setting.
Sleep Delay— Designates the wait time until entering sleep mode.
Limit Module Wakeup—For modules that wake on a tester message, recommend the following settings.
Init Timeout (min) - Time Rebel continues polling.
Delay after polling (min) - Time after cease polling before power down. Allows the Rebel to enter a silent mode before sleep enabling modules to sleep.

The window also contains a default button which allows all settings to be automatically returned to their original states.

Settings Tab



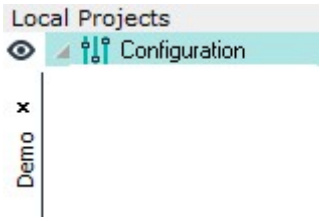
Keep Alive Setting:
You should not need to alter these settings unless instructed to do so by Influx Technology Engineers

Aux Power On:
Controls the Digital 3/+Vd pin of the Logger to supply power to the Rebel Dash or K-Box when the Logger is powered via the Vehicle Connector (CAN & PWR)

The window also contains a default button which allows all settings to be automatically returned to their original states.

Clicking 'OK' closes the window and creates the new 'Configuration' item.

Once a new 'Configuration' has been created it will appear in the 'Local Projects' panel, in the current 'Project' tab.

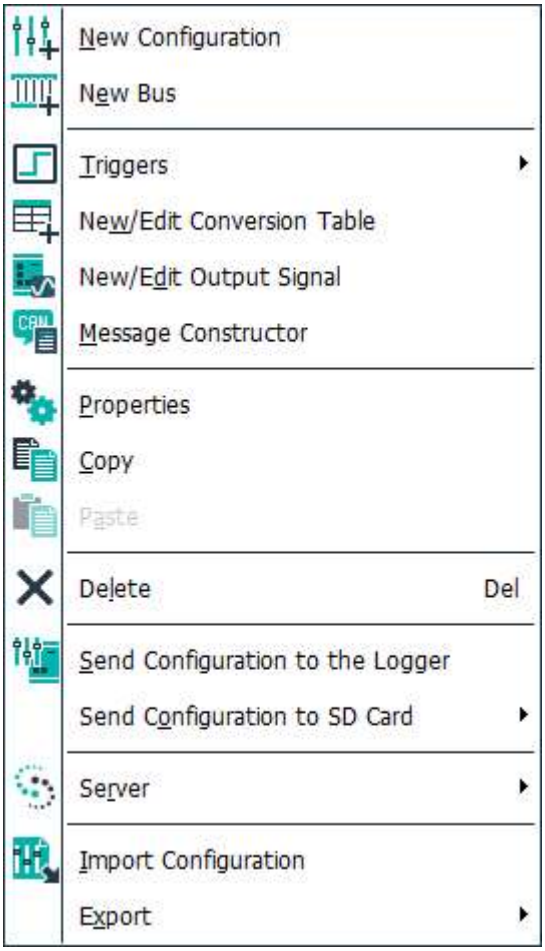


With a ‘Configuration’ selected, the ‘Properties’ tab of the ‘Main’ panel displays a summary of the ‘Configuration Structure’ built on this ‘Vehicle’ item as can be seen below.

Vehicle	Configuration
VIN	****
Calibration ID	****
Software ID	****
User	****
Date	17/02/16
Logger Type	Standard - Fast Sampling Rates Only
Logger Mode	Standard - All CAN Messages
Number of PIDs	0
Number of Diagnostic Addresses	0
Number of CCP Addresses	0
Number of CAN Signals	0
Number of Instrumentation Channels	0
Number of Digital Channels	0
Trigger Settings	
Number of Trigger Items	0

Properties | Stream Channels | PC Explorer

The ‘Configuration’ can also be created using a ‘right click’ menu as shown below



- New Configuration—Allows the creation of a new ‘Configuration’.
- New Bus—Creates a new ‘Bus’ item
- Triggers—Provides the ability to create and edit ‘Triggers’
- New/Edit Conversion Table—Provides the ability to create and edit ‘Conversion Tables’
- New/Edit Output Signal—Provides the ability to create and edit ‘Output Signals’
- Properties—Re-opens the ‘Vehicle Settings’ window for the current selected ‘Vehicle’ to allow editing of the ‘Vehicle’ settings.
- Copy—Copies selected item.
- Paste—Places copied item in to the ‘Local Projects’ panel.
- Delete—Removes selected item from the ‘Local Projects’ panel.
- Send Configuration to the Logger— Uploads ‘Configuration Structure’ to the Logger
- Send Configuration to SD Card— Uploads ‘Configuration Structure’ to the SD Card
- Import Configuration—Allows the user to import an .IVS, ‘Configuration Structure’ file.
- Export—Allows the export of the current ‘Configuration Structure’ as either a .IVS file or a .ROB file, for transfer between installations.

4.5—Bus

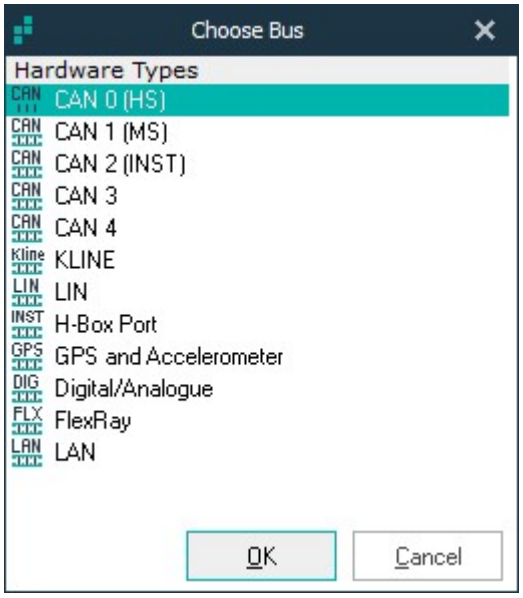
4.5.1—Creating a Bus

The second step in building a 'Configuration Structure' is to select the required 'Bus'. A 'Bus' is the physical connection between the logger and the vehicle and determines how the Rebel will communicate with the configuration being logged.

There are a number of different 'Bus' types available and it is possible to have up to one of each type of 'Bus' per 'Configuration Structure'.

Creating a Bus

To create a new 'Bus', select the required 'Vehicle' and use the 'New Bus' toolbar icon or the right click menu.



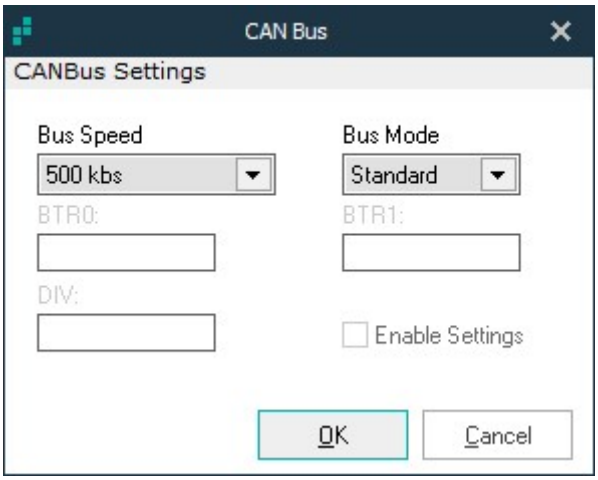
Hardware Types

- CAN 0 (HS)—CAN bus 0.
- CAN 1 (MS)—CAN bus 1.
- CAN 2 (INST)—CAN bus 2.
- CAN 3—CAN bus 3.
- CAN 4—CAN bus 4.
- KLINE—ISO 9141-2 and ISO 14230-4 Kline bus
- LIN—Local Interconnect Network bus
- H-Box Port—Connection to the internal Instrumentation board, instructs the logger to record from the board.
- GPS and Accelerometer—GPS and Accelerometer connection and instructs the logger to record GPS and Accelerometer data.
- Digital/Analogue—Designates the digital inputs.
- FlexRay—High Speed FlexRay Bus
- LAN—Ethernet Bus

Select the required 'Bus' type and click 'OK'.

Upon selecting a 'Bus' type a window with a number of options for the selected 'Bus' opens. The window and options are dependent on the bus selected and are considered individually below.

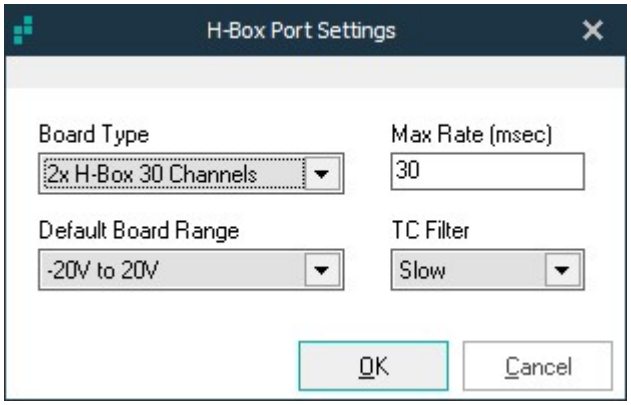
CAN Buses



CAN Bus Settings:
Bus Speed—Drop down menu selects the transmission rate for the 'Bus'.
Bus Mode—Drop down menu selects the operational mode for the 'Bus'.

Enable Settings:
Currently disabled.

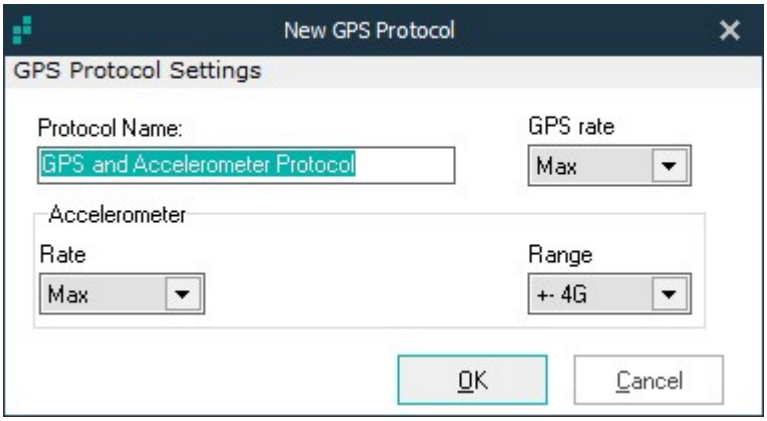
H-Box Port Instrumentation Bus



H-Box Port Settings:

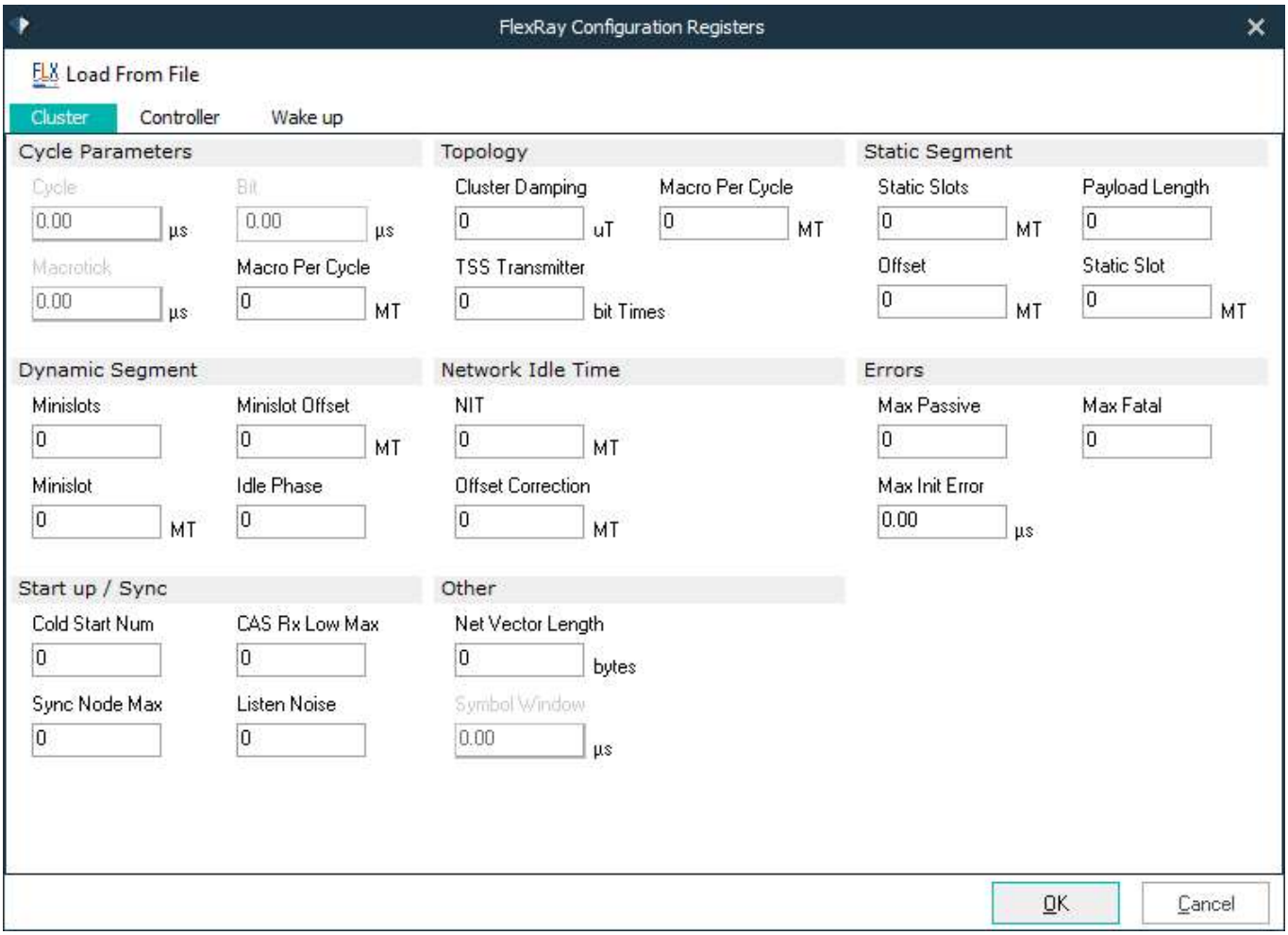
- Board Type—Drop down menu selects the Influx instrumentation board type installed.
- Max Rate—Specifies the maximum transmission rate.
- Default Board Range—Sets the Hardware Voltage Range to be used.
- TC Filter—Enables/Disables filtering of thermocouple data and selects the speed of the filter

GPS and Accelerometer Bus

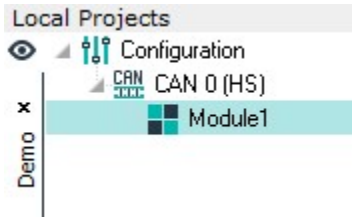


GPS and Accelerometer Settings:

- Protocol Name—Name of the Bus.
- GPS Rate—Rate at which GPS Data is Logged.
- Accelerometer Rate—Rate at which Acceleration is Logged, Max will Log at a very high rate and use a lot of space on the SD Card, if Acceleration Data is not needed it is recommended that this be limited.
- Accelerometer Range—Sets the Range of Acceleration that can be recorded

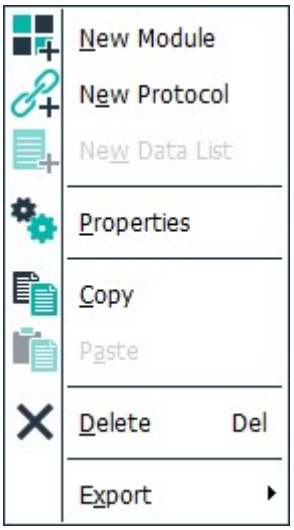


Normally the configuration is loaded from a FIBEX file but it can be manually configured as well.



Clicking ‘OK’ will close the window and creates the selected ‘Bus’ which appears in the ‘Local Projects’ panel.

As can be seen, this process also automatically creates a ‘Module’, with a ‘Bus’ created, this enables a ‘right click’ menu, when a ’Bus’ is selected, as shown below.



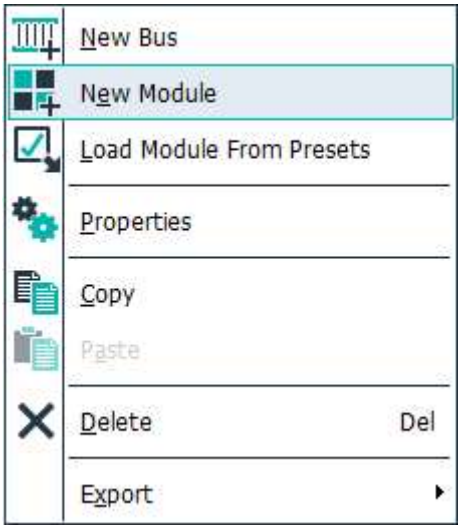
New Module—Allows the creation of a new ‘Module’
Load Protocol—Allows the creation of a ‘Protocol’
Properties—Re-opens the ‘CAN Bus Settings’ window to allow editing of the settings.
Copy—Copies the complete ‘Bus’, to allow ‘Pasting’ into alternative open ‘Projects’ in the software.
Paste—Places the ‘Copy’ of a ‘Bus’ into the selected ‘Projected’, however note only one ‘Bus’ of each type is allowed in a single ‘Project’.
Delete—Removes the entire selected ‘Bus’ from the ‘Configuration’.
The Projects are designed to allow the administration of a large number of different ‘Configuration Structures’

4.6—Module

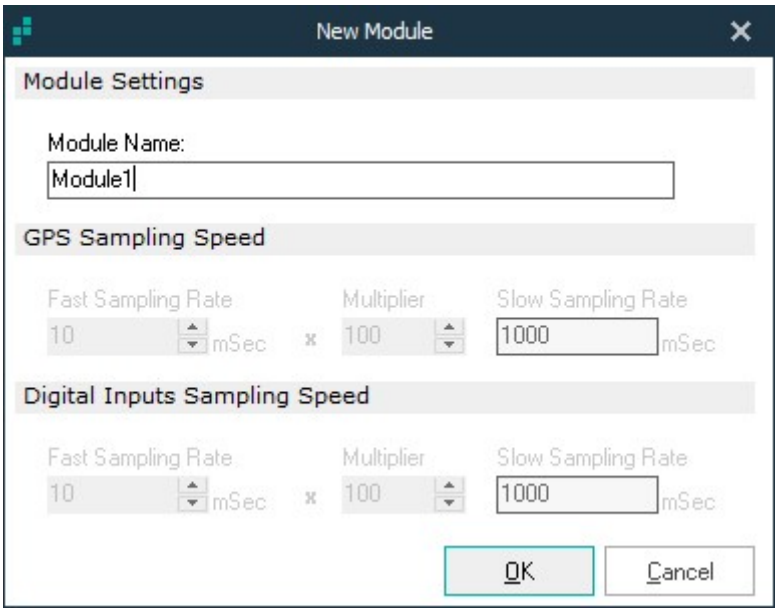
The third step in building a ‘Configuration Structure’ is to create a ‘Module’. A ‘Module’ is analogous to the module/ECU within the vehicle to be logged.

Creating a Module

To create a new ‘Module’, select the required ‘Bus’ and use the ‘New Module’ toolbar icon, or the ‘right click’ menu as shown below



The ‘Module Settings’ window is shown below

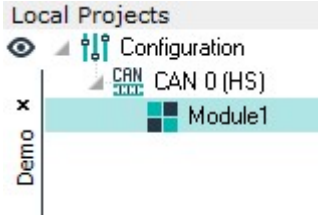


Module Settings:

- Module Name—Allows the user to designate the name for the module.

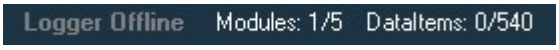
GPS/Digital Inputs Sampling Speed:

- Fast Sampling Rate—Designates the faster rate of sampling.
- Multiplier—Over sampling multiplier, calculates the slow sampling rate.
- Slow Sampling Rate—Specifies the calculated slow sampling rate.



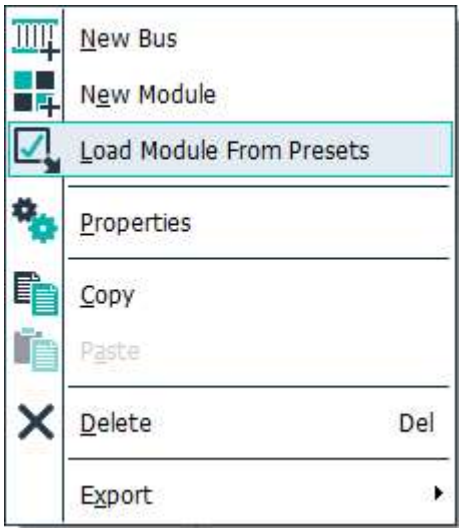
Once a new ‘Module’ has been created it will appear in the ‘Local Projects’ panel.

There is a maximum of five ‘Modules’ permitted per ‘Configuration Structure’ and the current tally can be found in the ‘Status Bar’.



Creating a Module from Presets

A second method allows a ‘Module’ to be created by loading pre-configured settings. This is achieved by using the ‘Bus’ activated ‘right click’ menu as shown below.



The ’Load Module from Presets’ menu item opens a window, which allows the user to import a DiaLog Presets File (.DPF) to automatically configure a ‘ Module’.

With a ‘Module’ created, this enables a ‘right click’ menu, as shown below.

- New Module—enables the user to create a new ‘Module’ on the same ‘Bus’ as the current selected ‘Module’.
- New Protocol—enables the user to create a new ‘Protocol’ on the selected ‘Module’
- Properties—Re-opens the ‘Module Settings’ window, to allow the user to edit the settings for the selected ‘Module’.
- Copy—Copies the ‘Module’, to allow pasting into alternative open ‘Projects’ in the software.
- Paste—Places the copy of a ‘Module’ into the selected ‘Bus’.
- Delete—Removes the selected ‘Module’ from the ‘Bus’.

4.7—Protocol

4.7.1—Introduction

The fourth stage of creating a ‘Configuration Structure’ is to create the ‘Protocol’. A ‘Protocol’ is the definition of the method of communication between the Rebel and the vehicle. There are a number of different ‘Protocols’ available and it is possible to have multiple ‘Protocols’ running within one ‘Configuration Structure’. However as a ‘Protocol’ defines the communication for each ‘Module’ only one protocol can be used per ‘Module’ and not all ‘Protocols’ can be used on every ‘Bus’.

There are a number of different ‘Protocol’ options, which vary depending on the ‘Bus’ type selected. The different options are considered below. However, physical module specific restrictions may also apply.

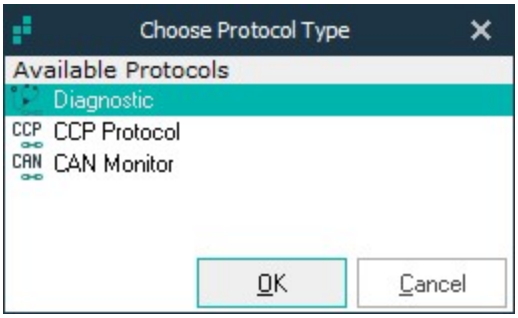
Bus Types	Protocol Types					
	Diagnostic	CCP	CAN Monitor	Instrumentation	GPS	Digital
CAN HS	✓	✓	✓			
CAN INST	✓	✓	✓			
CAN MS	✓	✓	✓			
Instrumentation				✓		
GPS					✓	
Digital						✓

Creating a Protocol

To create a new 'Protocol', select the required 'Module' and use the 'New Protocol' toolbar icon or the right click menu.

As discussed above there are a number of 'Protocol' options depending on the 'Bus' type. Here a 'Protocol' being created on a 'CAN' bus is shown, the process is analogous for all 'Bus' types. Each 'Protocol' type is considered in detail in the following sections.

Upon creating a 'Protocol' the 'Choose Protocol Type' window will appear as shown below.

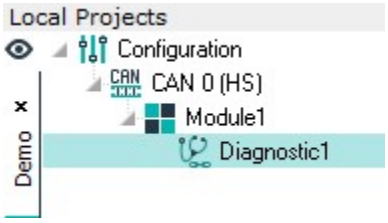


Available Protocols:

- Diagnostic
- CCP Protocol
- CAN Monitor
- Instrumentation
- GPS
- Digital

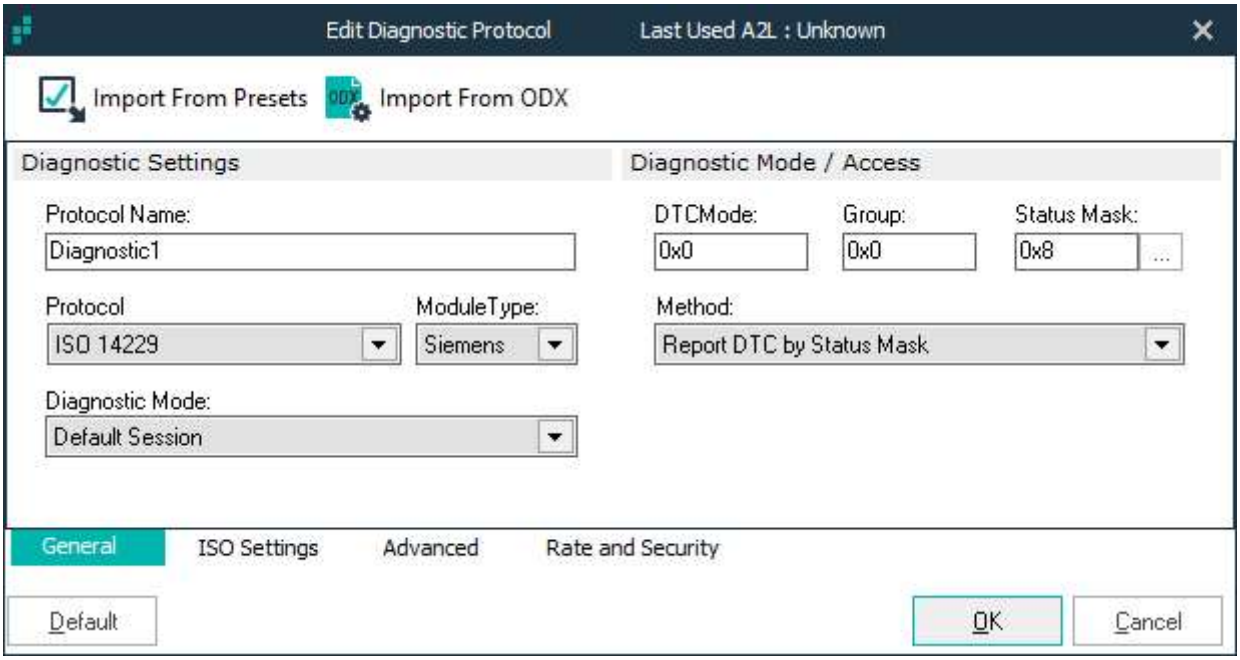
Each 'Protocol' can only be used once for each 'Module', if a 'Protocol' already exists for the selected 'Module', it will automatically not appear in the 'Choose Protocol Type' window shown previously.

Upon selecting a 'Protocol' type, the 'Settings' window will appear. For full details on each 'Protocol' type please refer to the relevant sections, where each is considered individually.



Once a ‘Protocol’ has been created, it appears in the ‘Local Projects’ panel.

Once a ‘Protocol’ has been created the settings can be edited using the ‘Properties’ window, an example is shown below.

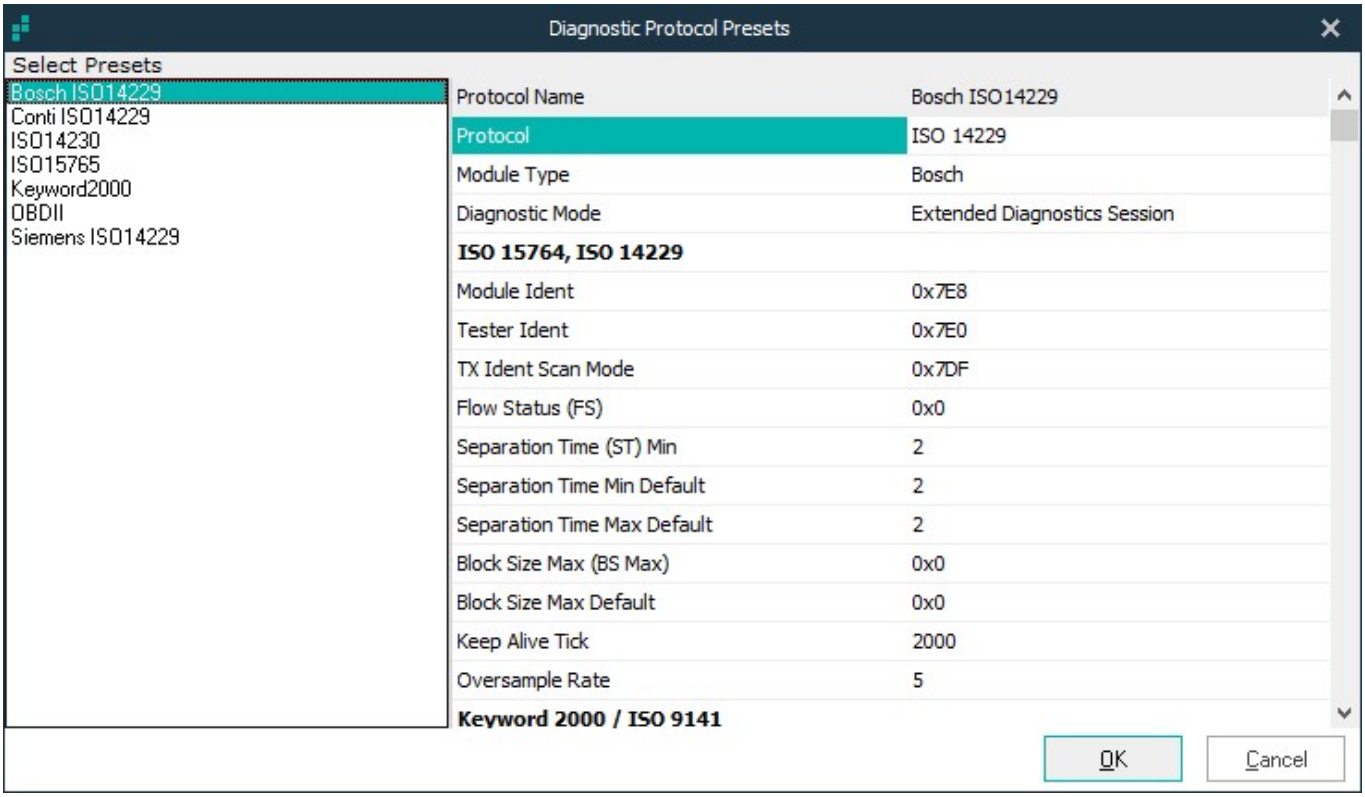


The window is specific to each ‘Protocol’, however, for all ‘Protocols’ where description file imports are possible. If any ‘Data Items’ have been imported for the ‘Protocol’, the file utilised is denoted in the bar at the top of the window. With a ‘Protocol’ item created a ‘right click’ menu is enabled.

- New Protocol—Allows the user to create a new ‘Protocol’ on the same ‘Module’.
- New PID—Allows the user to manually create a new PID ‘Data Item’.
- New Data List—Allows the user to manually create a new ‘Data List’.,
- Properties—Displays a summary of the ‘Protocol’ in the ‘Properties’ panel.
- Copy—Copies the selected ‘Protocol’.
- Paste—Places the copied item into the ‘Configuration Structure’.
- Delete—Removes the selected item from the ‘Configuration Structure’.
- Save To Presets—Allows the user to save the ‘Protocol’ as a .DPV file, for loading into alternative ‘Configuration Structures’.

4.7.2—Diagnostic Protocol

This section details the options for the ‘Diagnostic Protocol’, upon selecting a ‘Diagnostic Protocol’ the ‘Diagnostic Protocol Presets’ window will appear as shown below.

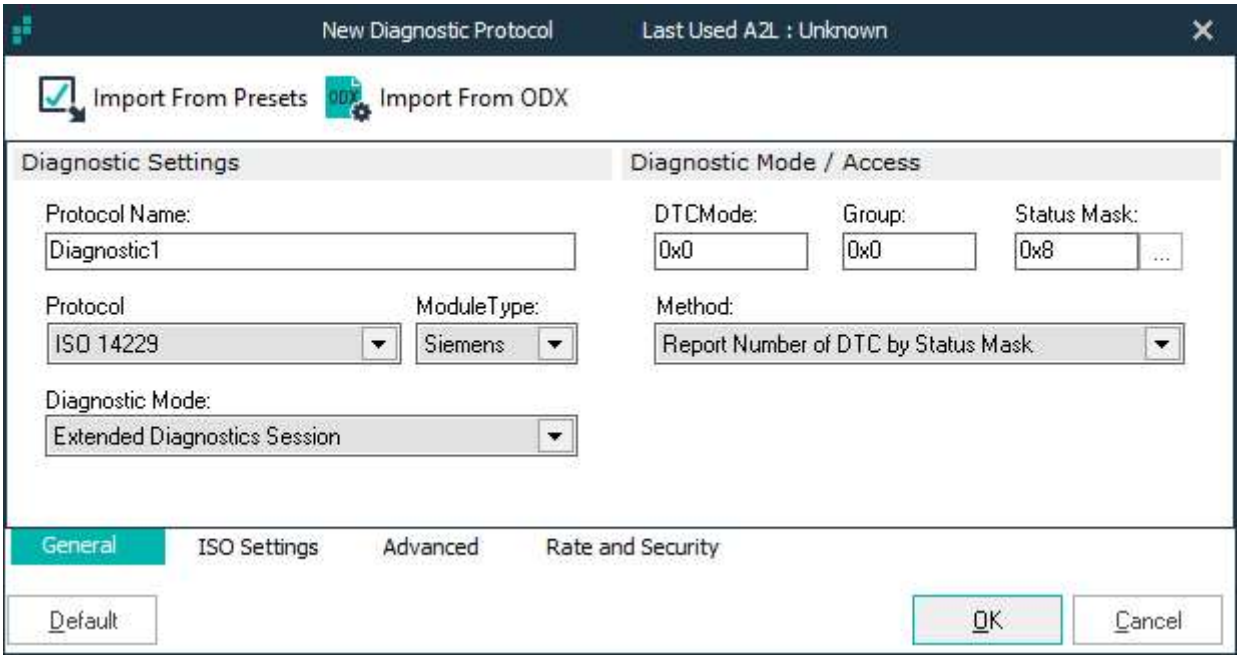


This window contains a number of pre-configured settings for three possible applications.

- Bosch_ISO14229—Contains settings designed to be used for diagnostic purposes on modules manufactured by Bosch using ISO14229.
- Conti_ISO14229—Contains settings designed to be used for diagnostic purposes on modules manufactured by Continental Automotive Systems using ISO14229.
- ISO14230—Contains settings designed to be used for diagnostic purposes on modules using ISO14230.
- ISO15765—Contains settings designed to be used for diagnostic purposes on modules using ISO15765.
- OBD_Generic—The settings configured in this option are aimed at the general user, allowing diagnostic data to be collected from any module supporting EOBD/OBDII.
- Siemens_ISO14229—Contains settings designed to be used for diagnostic purposes on module manufactured by Siemens using ISO14229.

These ‘Presets’ are designed to allow the user to quickly and simply, with minimal understanding required, create a ‘Protocol’ that is applicable to large numbers of vehicles and tasks.

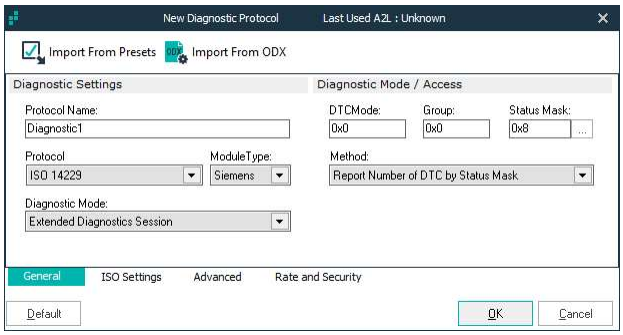
The individual settings are considered in detail below. If none of the 'Presets' are required then click 'Cancel' to close the window and open the 'New Diagnostic Protocol' window, without any pre-configuring of the settings, as shown below.



The window opens on the 'General' tab by default. There is also an 'Import from Presets' button, which re-opens the 'Diagnostic Protocol Presets' window above. The window also contains a 'Default' button allowing restoration of original settings.

The 'Protocol' settings are considered below.

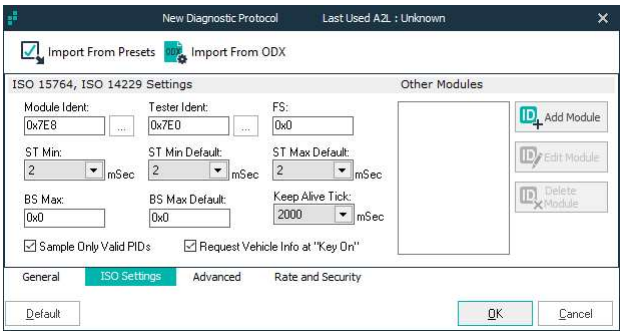
General Tab



Diagnostic Settings:

- Protocol Name—Allows users to designate a name for the 'Protocol'.
- Protocol—Drop down menu selects the ISO standard to be utilised.
- Module Type—Drop down menu selects the module manufacturer.
- Diagnostic Mode—Drop down menu selects the diagnostic session type.
- Diagnostic Mode/Access:
  - DTC Mode—Designates the Diagnostic Service to be utilised.
  - Group
  - Status Mask—Advanced DTC reading status mask.
  - Method—Drop down menu selects the method for DTC report.

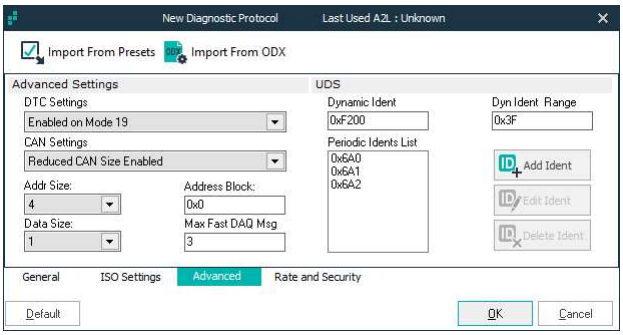
ISO Settings Tab



ISO 15765, ISO 14229 Settings:

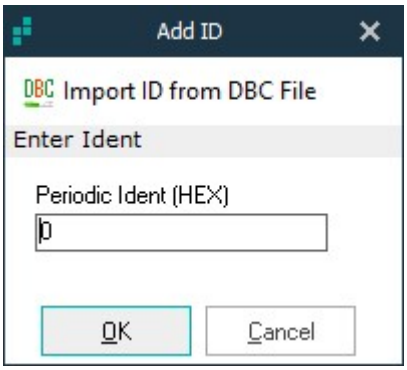
- Module Ident—Designates the identifying label for all module messages.
- Tester Ident—Designates the identifying label for all tester messages.
- Tx ID Scan Mode—
- FS—Designates the flow status for the flow control frames.
- ST Min—Specifies the message transmission separation time for consecutive frames.
- ST Min Default—Specifies the separation time minimum.
- ST Max Default—Specifies the separation time maximum.
- BS Max—Specifies the maximum message block size.
- BS Max Default—Specifies the default message block size.
- Keep Alive Tick—
- Check For Valid PID Range—Instructs the software to automatically insert a check valid PID range command.

Advanced Tab



Advanced Settings:

- DTC Settings - Drop down menu selects the required DTC settings.
- CAN Settings—Drop down menu selects CAN message settings.
- Addr Size—Specifies the number bytes per address.
- Address Block
- Data Size—Specifies the number bytes per data item.
- Max Fast DAQ Msg—Specifies the maximum n
- UDS:
- Dynamic Ident—Specifies the Dynamic Data Identifier.
- Dyn Ident Range— Number of Idents available.
- Periodic Idents List—Lists all created Periodic identifiers
- Add Ident—Allows the user to add a new Identifier, opens the window shown below.
- Edit Ident—Allows the user to edit the settings for the selected Identifier.
- Delete Ident—Removes selected identifier.
- Enter Ident:
- Periodic Ident—Allows the user to manually specify the required Identifier.

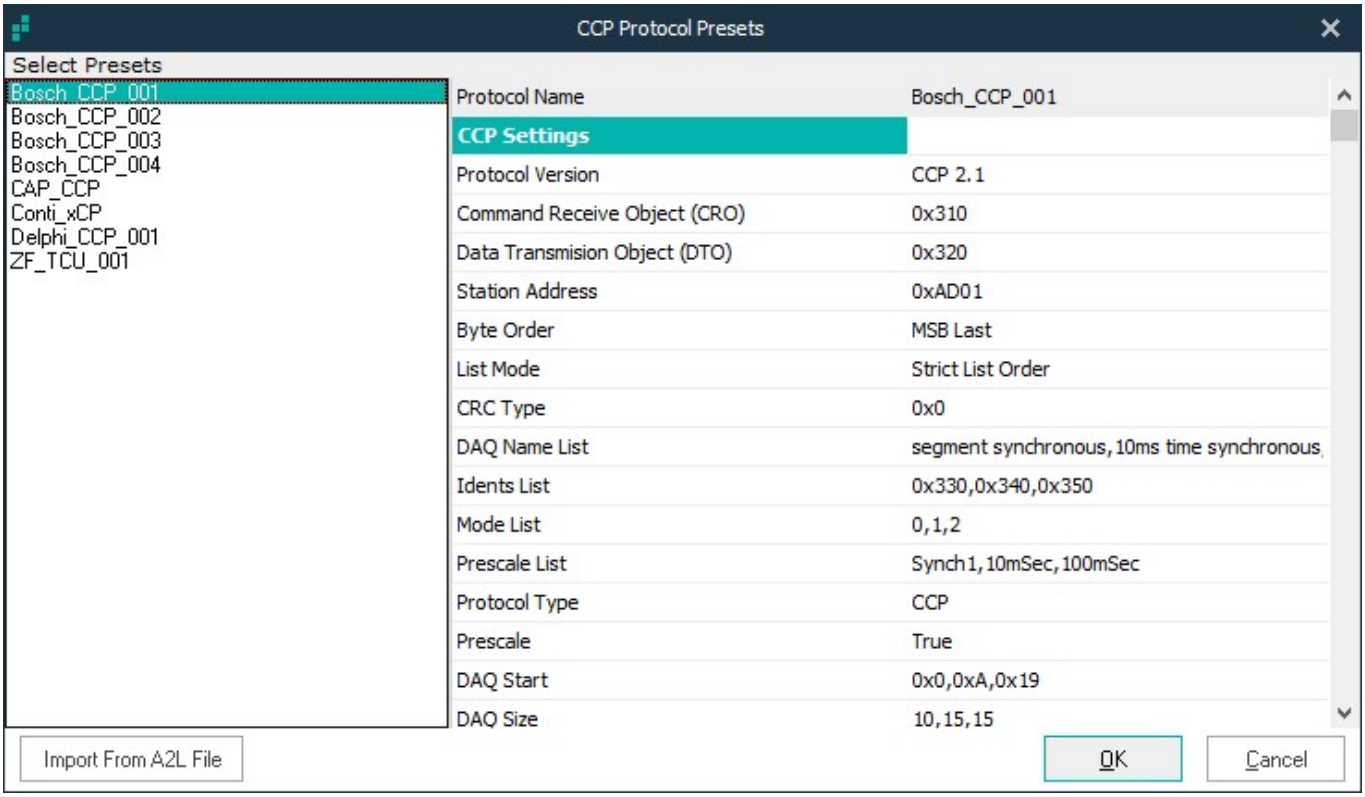


Import ID from DBC File—Allows the user to import the required Data Identifier from a .DBC file, once the required file is selected it opens the window shown to the right. Selecting a CAN item from the list automatically enters the identifier.

Once all the settings have been configured as required, clicking ‘OK’ will close the window and creates the ‘Protocol’ as specified.

4.7.3—CAN Calibration Protocol

This section details the options for the ‘CCP/xCP Protocol’, upon selecting a ‘CCP Protocol’ the ‘CCP Protocol Presets’ window will appear as shown below.



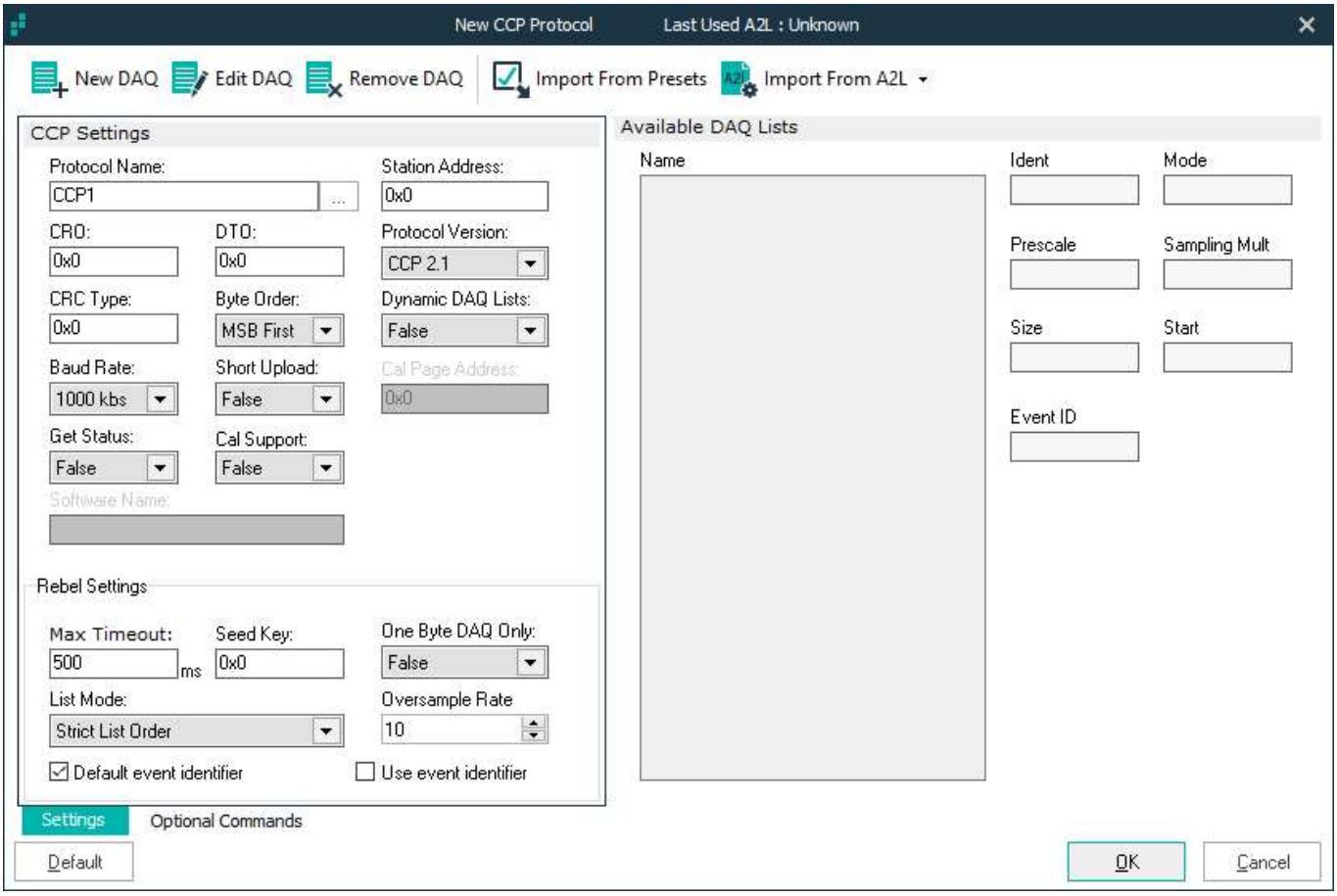
This window contains a number of different pre-determined settings for three possible applications.

The settings are designed to be used for modules manufactured by various Manufacturers and should allow the user to immediately configure the ‘Protocol’ to work with all modules.

These ‘Presets’ are designed to allow the user to quickly and simply create a ‘Protocol’ that is universally applicable to large numbers of vehicles and tasks.

The window also contains an ‘Import from A2L File’ button, this allows the settings for the ‘CCP Protocol’ to be automatically determined using an appropriate A2L file and opens the ‘New CCP Protocol’ window as discussed below. (An A2L file is an ‘ASAM MCD 2 MC-language’ file which indexes the internal memory layout for a specific module.)

The individual settings are considered in detail below. If none of the 'Presets' are required then click 'Cancel' to close the window and open the 'New CCP Protocol' window as shown below.



CCP Settings:

- Protocol Name—Allows the user to specify the name for the 'Protocol'.
- Station Address—Specifies module.
- CRO—Command Receive Object.
- DTO—Data Transmit Object.
- Protocol Version—Drop down menu selects the standard to be utilised.
- CRC Type—Not used.
- Byte Order—Endian format.
- Prescale—Use Prescale setting.
- Use Event Identifier—Use Event ID setting.
- List Mode—Specifies list numbering method.
- Oversample Rate—Specifies the ratio of missed data points to recorded.
- Baud Rate—Transmission rate of module.
- Keep Alive:
- Use Keep Alive—Selects to use the Keep Alive function.

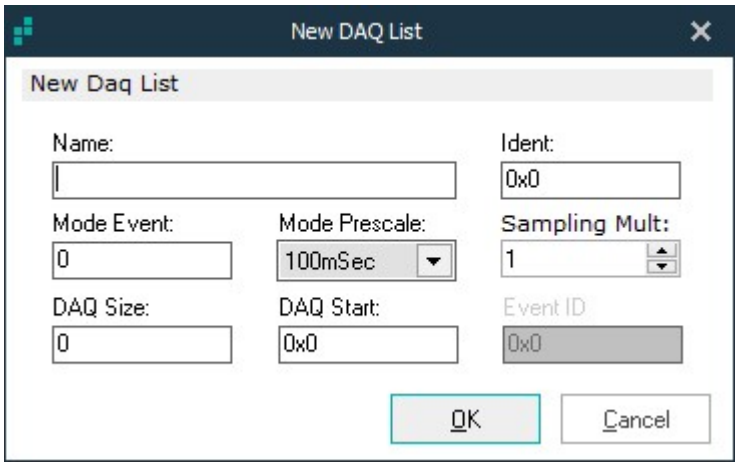
Available DAQ Lists:

- Name—Lists all existing DAQ lists.
- Ident—Response object identifier.
- Mode—Specifies DAQ list in module.
- Prescale—Physical name of DAQ list.
- Sampling Mult—Specifies oversampling rate.
- Size—Number of DAQ lists the module will support.
- Start—Specifies the list position.
- Event ID—Identifier for the raster rate.

(Standard CCP settings, please consult relevant ASAM documentation.)

The toolbar along the top of the window also contains a number of icons. These includes an 'Import from A2L File' button once again. There is also an 'Import from Presets' button, which re-opens the 'CCP Protocol Presets' window above. The window also contains a 'Default' button allowing restoration of original settings.

However, there are also 'Add ID', 'Edit ID' and 'Delete ID'. The 'Add ID' button opens the 'New DAQ List' window shown below.



New DAQ List:

- Name—Allows the user to specify the name for the DAQ list.
- Ident—Response object identifier.
- Mode Event—Specifies the DAQ list.
- Mode Prescale—Physical name of DAQ list.
- Sampling Mult—Specifies oversampling rate.
- DAQ Size—Number of Starts allowed.
- DAQ Start—Identifier byte.
- Event ID—Identifier for the raster rate.

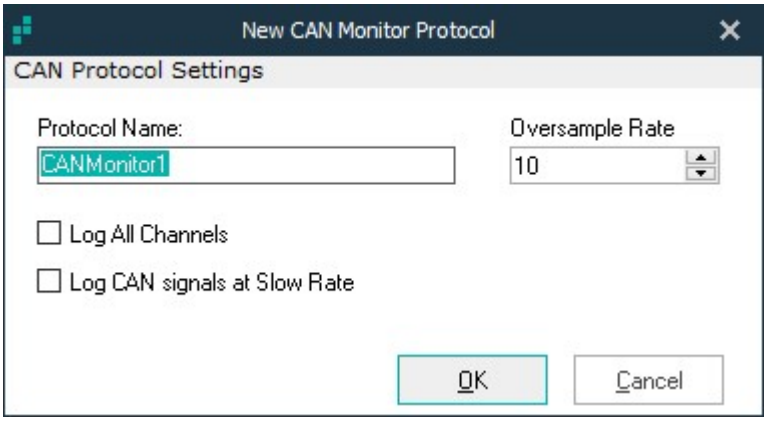
(Standard CCP settings, please consult relevant ASAM documentation.)

This windows allows the creation of a new 'DAQ list', which will then appear in the 'Name' panel of the 'New CCP Protocol' window. The 'Edit ID' button reopens the window seen above to allow the user to edit the settings for the 'DAQ list'. The 'Remove ID' allows the user to remove the selected 'DAQ list' from the 'Protocol'. However, at least one 'DAQ List' is required to create a 'CCP Protocol'.

Once all the settings have been configured as required, clicking 'OK' will close the window and create the 'Protocol' as specified.

4.7.4—CAN Monitor Protocol

This section details the options for the 'CAN Monitor Protocol', upon selecting a 'CAN Monitor Protocol' the 'New CAN Monitor Protocol' window will appear as shown below.



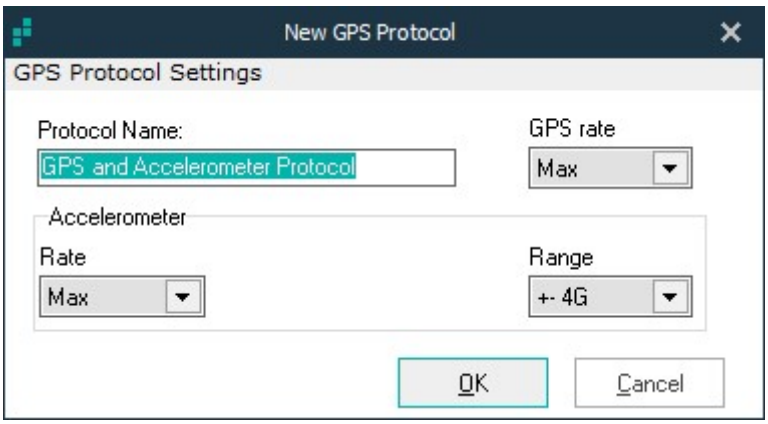
CAN Protocol Settings:

- Protocol Name—Allows the user to specify the name for the 'Protocol'.
- Oversample Rate—Specifies the ratio of missed data points to recorded.
- Log All Channels—Selects to record all raw CAN data messages transmitted on the bus.
- Log CAN signals at Slow Rate

Once all the settings have been configured as required, clicking 'OK' will close the window and create the 'Protocol' as specified.

4.7.5—GPS Protocol

This section details the options for the ‘GPS Protocol’, upon selecting a ‘GPS Protocol’ the ‘New GPS Protocol’ window will appear as shown below.



Once all the settings have been configured as required, clicking ‘OK’ will close the window and create the ‘Protocol’ as specified.

4.8—Data Items

4.8.1—Introduction

The final step in creating a 'Configuration Structure' is to select the 'Data Items' - the different values or signals to be recorded by the Rebel. The 'Data Items' capable of being logged via each 'Protocol' varies. Therefore each 'Data Item' option will be considered separately in the following sections.

The 'Data Items' available for each 'Protocol' are summarised below.

Data Items	Protocol Types					
	Diagnostic	CCP	CAN Monitor	Instrumentation	Digital	GPS
PID	✓					
Address	✓	✓				
Signal			✓			
Channel				✓	✓	✓

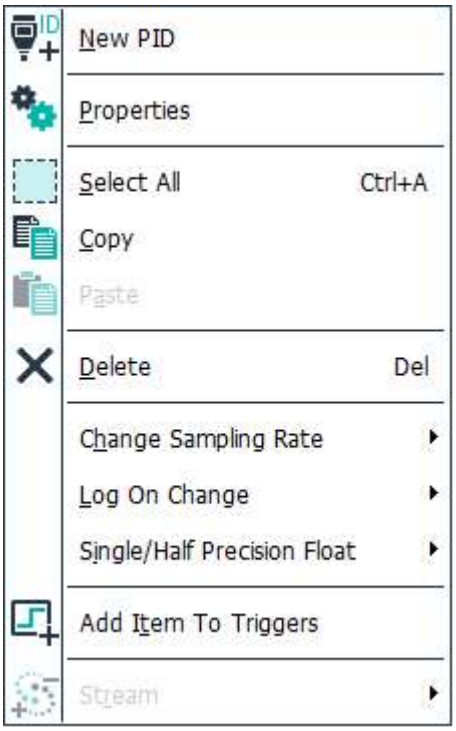
Once a 'Data Item' has been added to a 'Configuration Structure' it will appear in the 'Data Items' panel as can be seen in the example below, which contains a number of Mode 0x01 PIDs.

No.	Rate	Stream	Label	Units	PID	Address	Size	Datatype
1	**1 Sec**	No	O2S11	V	0x14	0x00	2	Unsigned Byte
2	**1 Sec**	No	O2S12	V	0x15	0x00	2	Unsigned Byte
3	**1 Sec**	No	O2S13	V	0x16	0x00	2	Unsigned Byte
4	**1 Sec**	No	O2S22	V	0x19	0x00	2	Unsigned Byte
5	**1 Sec**	No	SHRTFT1	%	0x06	0x00	1	Unsigned Byte
6	**1 Sec**	No	SHRTFT11	%	0x14	0x00	2	Unsigned Byte
7	**1 Sec**	No	SHRTFT12	%	0x15	0x00	2	Unsigned Byte
8	**1 Sec**	No	SHRTFT13	%	0x16	0x00	2	Unsigned Byte
9	**1 Sec**	No	SHRTFT22	%	0x19	0x00	2	Unsigned Byte
10	**1 Sec**	No	PTO_STAT	-	0x1E	0x00	1	Unsigned Byte
11	2 Sec	No	CATEMP12	degC	0x3E	0x00	2	Unsigned Word
12	2 Sec	No	IAT	deg	0x0F	0x00	1	Unsigned Byte
13	2 Sec	No	ECT	degC	0x05	0x00	1	Unsigned Byte
14	2 Sec	No	AAT	degC	0x46	0x00	1	Unsigned Byte
15	2 Sec	No	CATEMP11	degC	0x3C	0x00	2	Unsigned Word
16	5 Sec	No	EGR_ERR	%	0x2D	0x00	1	Unsigned Byte
17	5 Sec	No	CATEMP21	°C	0x3D	0x00	2	Unsigned Word
18	5 Sec	No	EVAP_VP	Pa	0x32	0x00	2	Signed Word
19	5 Sec	No	CATEMP22	°C	0x3F	0x00	2	Unsigned Word
20	10 Sec	No	AIR_STAT: OFF		0x12	0x00	1	Bitfield

Properties | Items | PC Explorer

The 'Data Items' panel contains a 'Rate' icon at the top of the panel, this allows the user to edit the logging rate for the selected 'Data Item(s)' simultaneously.

The 'Data Items' panel also contains a 'right click' menu as shown below. However, this varies depending on the 'Data Items' and not all options will always be identical or available.



- New PID/Address/Channel—Allows the edition of a new ‘Data Item’, see each section for more detail.
- Properties—Opens the ‘Properties’ window of the selected ‘Data Item’, see relevant section for details.
- Select All—Selects all the listed ‘Data Items’.
- Copy—Creates an exact replica of the selected ‘Data Item(s)’.
- Paste—Places the copied ‘Data Items’ where selected.
- Delete—Removes the selected ‘Data Item(s)’ from the list.
- Change Sampling Rate—Allows the user to reassign the sampling rate for the selected ‘Data Item(s)’, see individual sections for options.
- Add Item to Triggers—Opens the ‘New Condition’ window for Triggers

4.8.2—Periodic Identifiers

Periodic Identifiers (PIDs) allow the data logger to identify a data record and at a set rate retrieve the recorded data value for the given data identifier.

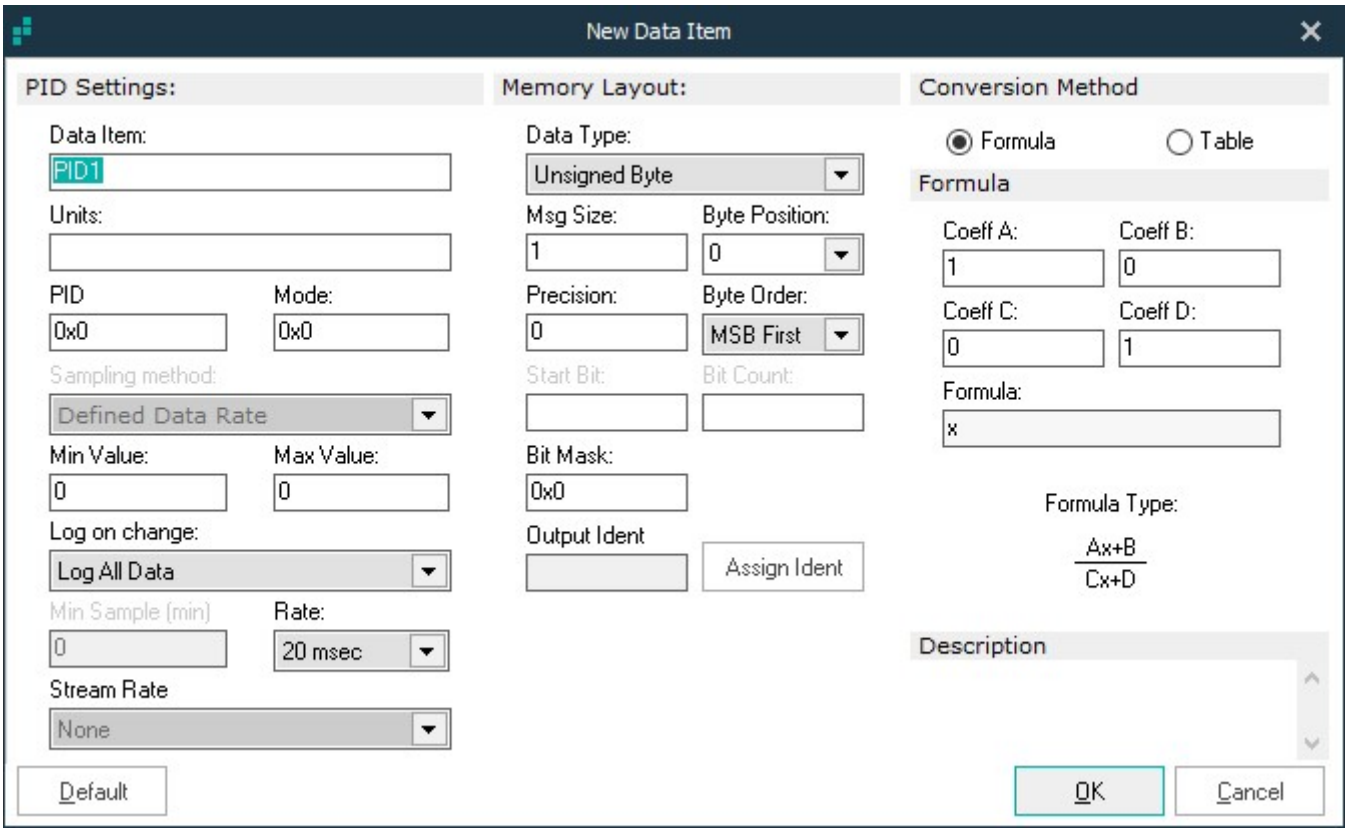
There are a number of different methods in DiaLog for adding PIDs to a ‘Configuration Structure’, these are Manual Addition of a PID, Import of a PID from Presets or Import of a PID from an .ODX file. These different methods are considered individually below.

Within DiaLog it is also possible to copy PIDs from anywhere within the software and paste them into the required ‘Configuration Structure’. However, these PIDs can be specific to the vehicle being logged and care must be taken in this respect.

4.8.2.1—Manual Addition of a Periodic Identifier

A PID can be added manually to a 'Configuration Structure' using either the Configuration 'Navigation Bar' menu, the 'Local Projects' 'right click' menu, the 'Items' panel 'right click' menu.

The 'New Data Item' window is shown below.



PID Settings:

- Data Item—Specified the PID name.
- Units—Specifies the units for the PID.
- PID—Specifies the Hexadecimal label for the PID.
- Mode—Specified the diagnostic service to be utilised to read the PID.
- Sampling Method—Not currently implemented.
- Min Value—Specifies the minimum value for the data.
- Max Value—Specifies the maximum values for the data.
- Log on change—Selects log method, between all and only on change in value.
- Rate—Designates the sampling rate for the PID.

Memory Layout:

- Data Type—Drop down menu selects the data type.
- Size (bytes) - Response length.
- Byte Position—Location of first data byte in returned CAN message.
- Precision—Displayed decimal places.
- Byte Order—Endian format.
- Shift Left/Right—Binary manipulation.
- Bit Mask—Filter required bit.
- Output Ident—Specifies the Hexadecimal label for the output.
- Assign Ident—Allows the user to assign the identifier.

Conversion Method:

- Formula/Table—Allows the user to select between a formula or a predefined ‘Conversion Table’

Formula:

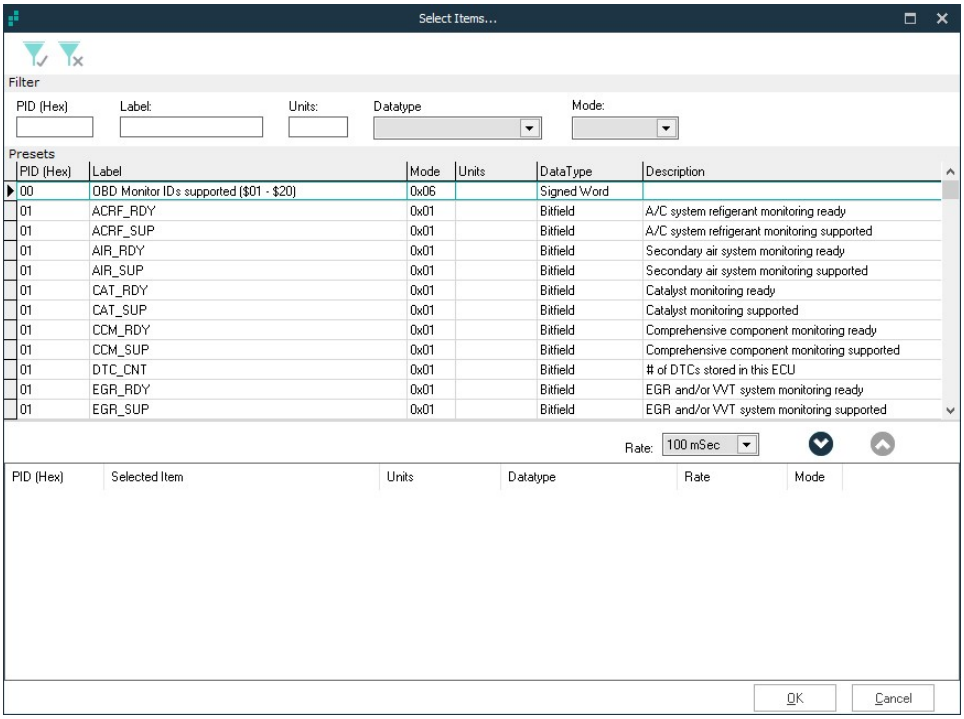
- Coeff A—Specify coefficient A in the formula type displayed.
- Coeff B—Specify coefficient B in the formula type displayed.
- Coeff C—Specify coefficient C in the formula type displayed.
- Coeff D—Specify coefficient D in the formula type displayed.
- Formula—Displays the created formula.

Once the required settings for the PID have been entered, clicking ‘OK’ automatically closes the window and adds the PID to the ‘Data Items’ panel. The ‘Data Item’ can be identified as a PID by the icon appearing at the beginning of the item row.

4.8.2.2—Import of a Periodic Identifier from Presets

A PID can be Imported into a ‘Configuration Structure’ from presets using the ’New PID’ toolbar option as shown below.

The ‘Select Items’ window is shown below.



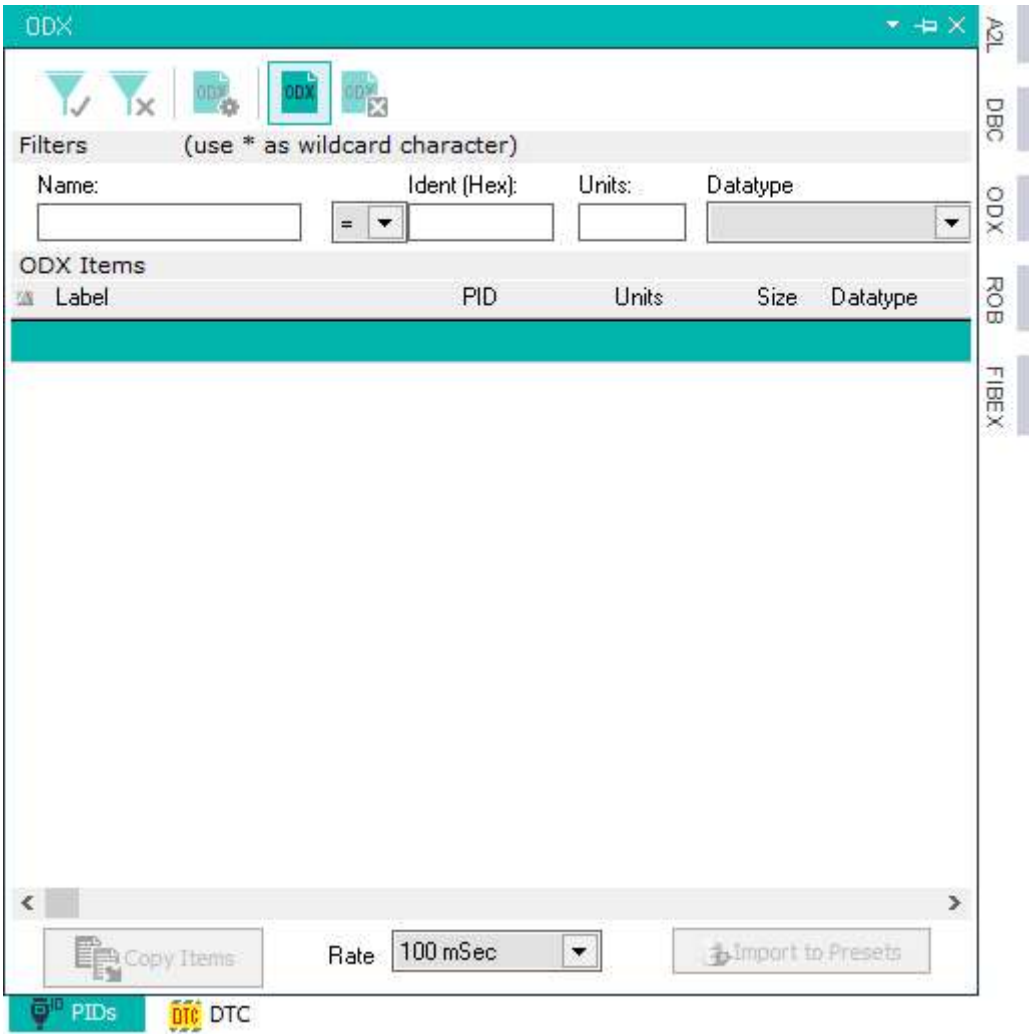
The window allows the user to select the required PID from the list of presets, with each one containing the prerequisite settings.

- Locate the required PID or using the filter criteria.
- Click ‘Add’ to move the selected item to the ‘Selected Items’ panel.
- Once all the required PIDs are listed in the ‘Selected Items’ panel, click ‘OK’ to close the window and import the PIDs.

It is also possible for the user to edit the ‘PID presets’

4.8.2.3—Import of a Periodic Identifier from an .ODX File

The final method for importing PIDs into a 'Configuration Structure' utilises an .ODX file, which is specific to the vehicle being logged. A PID can be imported in to a 'Configuration Structure' from an .ODX file using the 'ODX' import tab found on the right hand side of the 'Main' panel as shown below.



The panel is controlled by the toolbar along the top of the panel.

Click the 'ODX' toolbar icon to open an .ODX file.
Navigate to the required file and click 'Open' to import into the panel—the panel will now list all the PIDs for the vehicle. Locate and select the required PID items manually or by using the filtering criteria. The window also supports the import of .CSV filter files to automatically identify the required selection of PIDs.

Once the required PIDs have been identified the 'Rate' for the items must be selected.

Rate—Drop down menu selects the required logging rate.

With the required items selected and the settings chosen use the 'Copy Items' button to import them into the 'Configuration Structure'.

The panel also allows the imported .ODX file to be removed and a different .ODX file to be imported instead.

4.8.3—Addresses

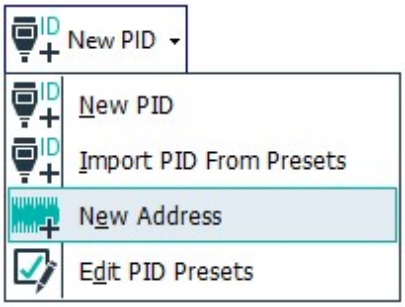
Memory Addresses allow the data logger to identify a data record and at a set rate retrieve the recorded data value from the given memory location.

There are a number of different methods in DiaLog for adding Address items to a 'Configuration Structure', these are Manual Addition of an Address and Import of an Address from either an .A2L or .ROB file. These different methods are considered individually below.

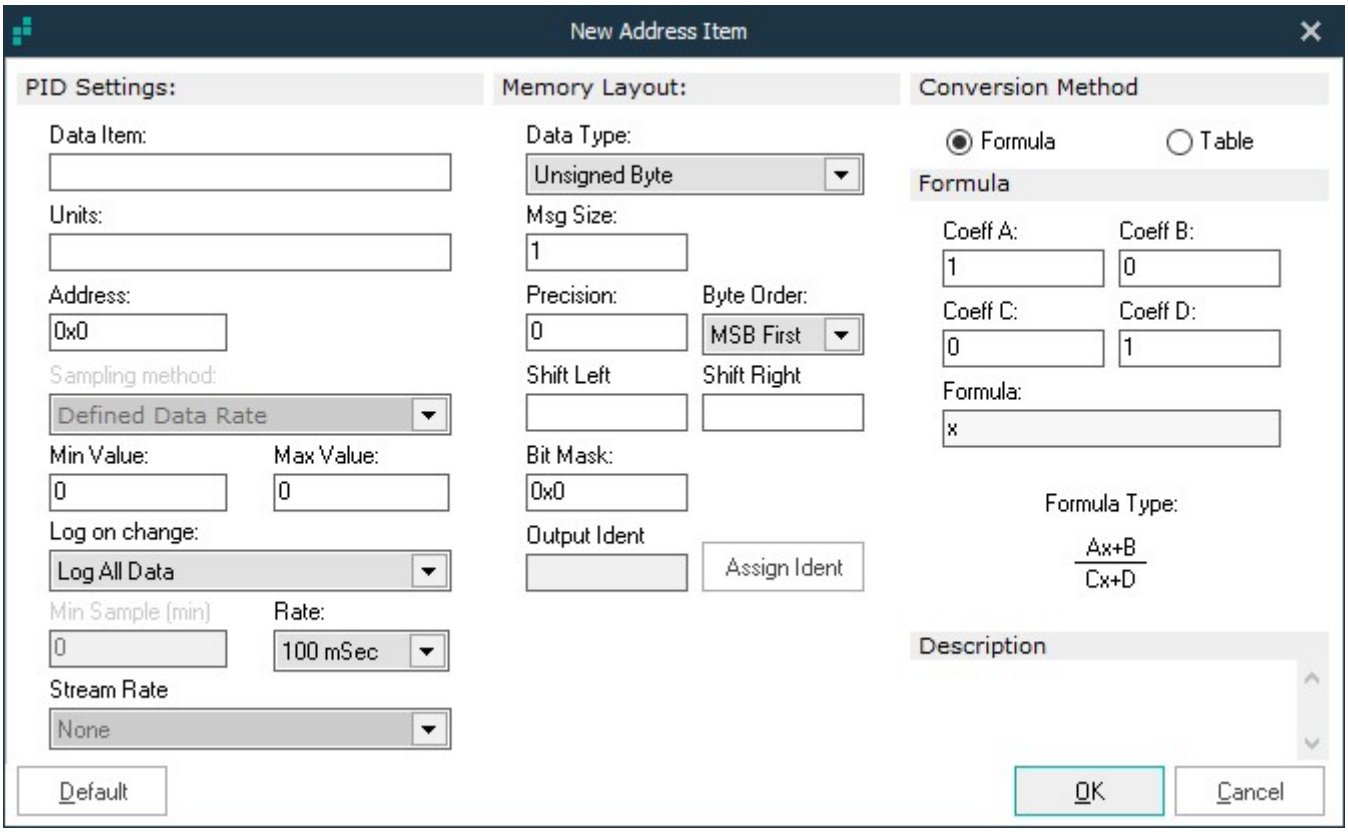
Within DiaLog it is also possible to copy Addresses from anywhere within the software and paste them into the required 'Configuration Structure'. However, these Addresses are specific to the vehicle being logged and care must be taken in this respect.

4.8.3.1—Manual Addition of an Address

An Address can be added manually to a 'Configuration Structure' using the 'New PID' toolbar as shown below.



The 'New Address Item' window is shown below.



PID Settings:

- Data Item—Specified the PID name.
- Units—Specifies the units for the PID.

- PID—Specifies the Hexadecimal label for the PID.
- Mode—Specified the diagnostic service to be utilised to read the PID.
- Sampling Method—Not currently implemented.
- Min Value—Specifies the minimum value for the data.
- Max Value—Specifies the maximum values for the data.
- Log on change—Selects log method, between all and only on change in value.
- Rate—Designates the sampling rate for the PID.

Memory Layout:

- Data Type—Drop down menu selects the data type.
- Size (bytes) - Response length.
- Byte Position—Location of first data byte in returned CAN message.
- Precision—Displayed decimal places.
- Byte Order—Endian format.
- Shift Left/Right—Binary manipulation.
- Bit Mask—Filter required bit.
- Output Ident—Specifies the Hexadecimal label for the output.
- Assign Ident—Allows the user to assign the identifier.

Conversion Method:

- Formula/Table—Allows the user to select between a formula or a predefined 'Conversion Table'

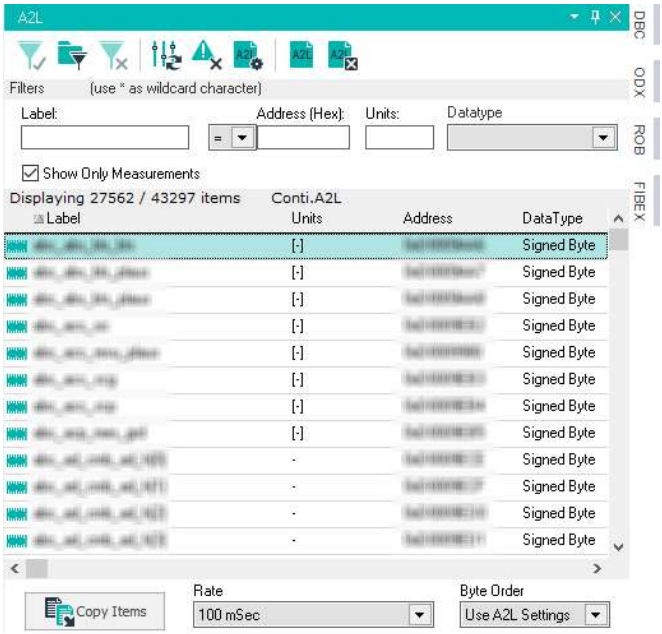
Formula:

- Coeff A—Specify coefficient A in the formula type displayed.
- Coeff B—Specify coefficient B in the formula type displayed.
- Coeff C—Specify coefficient C in the formula type displayed.
- Coeff D—Specify coefficient D in the formula type displayed.
- Formula—Displays the created formula.

Once the required settings for the PID have been entered, clicking 'OK' automatically closes the window and adds the PID to the 'Data Items' panel. The 'Data Item' can be identified as a PID by the icon appearing at the beginning of the item row.

4.8.3.2—Import of an Address from File

The second method for importing Addresses into a 'Configuration Structure' utilises either an .A2L file, which is specific to the vehicle being logged, or a .ROB file. An Address can be imported into a 'Configuration Structure' from an .A2L file using the 'ASAP' import tab or from a .ROB file using the 'ROB' import tab found on the right hand side of the 'Main' panel as shown below.



In this case the 'ASAP Editor' for .A2L files is shown. However the 'ROB Editor' panel is analogous.

The panel is controlled by the toolbar along the top of the panel.

- Click the 'A2L' toolbar icon to open an .A2L file.
- Navigate to the required file and click 'Open' to import into the panel—the panel will now list all the Addresses for the vehicle.
- Locate and select the required Address items manually or by using the filtering criteria. The window also supports the import of .CSV filter files to automatically identify the required selection of PIDs.

Once the required Addresses have been identified the 'Rate' and 'Byte Order' for the items must be selected.

Rate—Drop down menu selects the required logging rate.
Byte Order—Drop down menu selects the data byte order preference for the item.

With the required items selected and the settings chosen use the 'Copy Items' button to import them into the 'Configuration Structure'. A 'Data Item' can be identified as an Address by the icon appearing at the beginning of the item row.

The panel also allows the imported .A2L file to be removed and a different .A2l file to be imported instead. Once all the required Addresses have been imported, clicking the 'Tab' again closes the panel.

A2L files can also be swapped within a structure while maintaining the same selected data items. This is particularly useful in development situations, allowing a structure to be rapidly updated to a new software without being recreated.

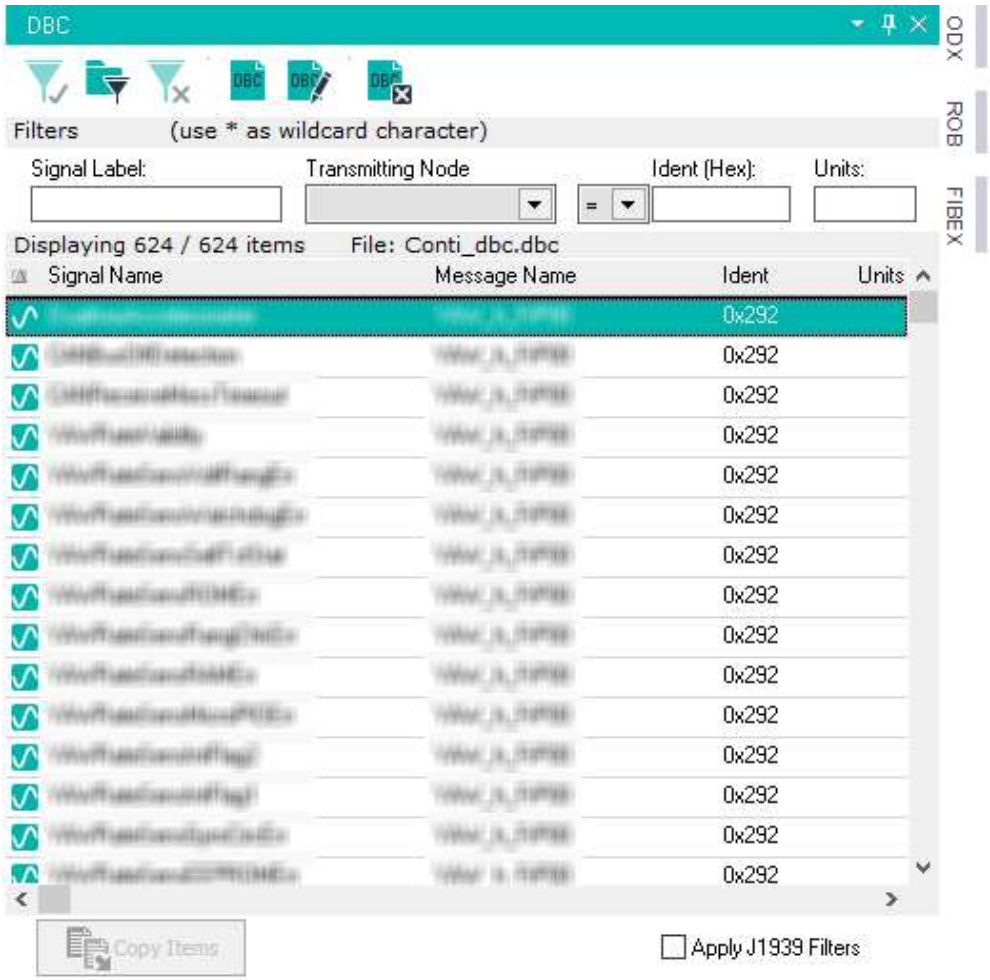
Allows the user to update the A2L settings for an existing Configuration Structure and list of memory address data items. Structures can be updated to new vehicle software levels simply and quickly.

4.8.4—Signals

Signals allow the data logger to identify individual CAN messages and record their data content. The method in DiaLog for adding Signal items to a 'Configuration Structure' is to import Signals from a .DBC file.

Within DiaLog it is also possible to copy Signals from anywhere within the software and paste them into the required 'Configuration Structure'. However, these Signals are specific to the vehicle being logged and care must be taken in this respect.

A Signal is imported in to a 'Configuration Structure' from a .DBC file using the 'DBC' import tab found on the right hand side of the 'Data Items' panel as shown below.



The panel is controlled by the toolbar along the top of the panel.

Allows the user to import a DBC file.

Opens the imported DBC file in the built-in DBC file editor.

Removes the imported DBC file from the tab

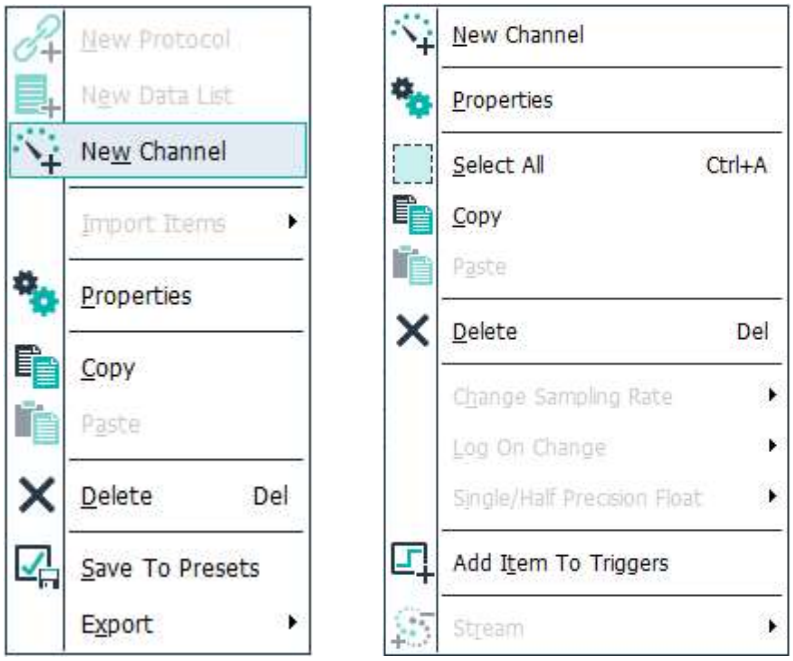
- Click the 'DBC' toolbar icon to open a DBC file.
- Navigate to the required file and click 'Open' to import into the panel—the panel will now list all the Signals for the vehicle.
- Locate and select the required Signal items manually or by using the filtering criteria. The window also supports the import of .CSV filter files to automatically identify the required selection of Signals.
- With the required items selected use the 'Copy Items' button to import them into the 'Configuration Structure'. A 'Data Item' can be identified as a Signal by the icon appearing at the beginning of the item row.

4.8.5—Channels

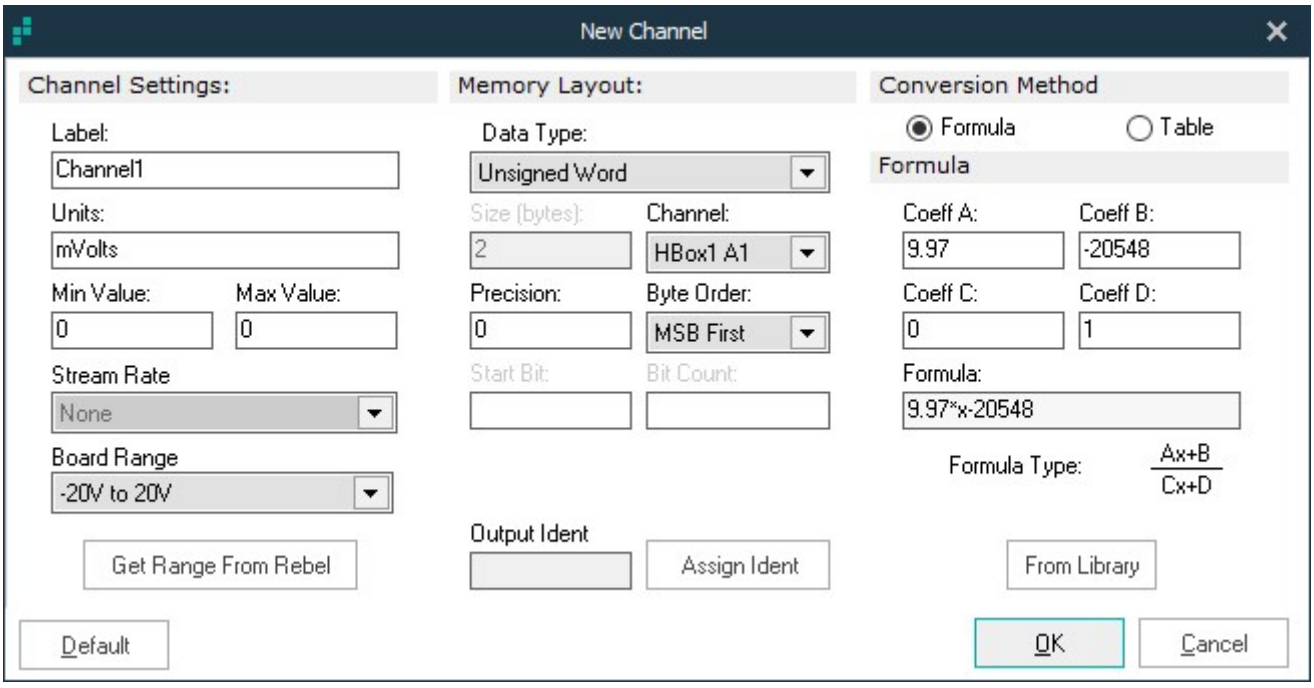
Channels allow the data logger to identify an Instrumentation input and record its value. The method in DiaLog for creating Channels in a 'Configuration Structure' is to manually add a Channel.

Within DiaLog it is also possible to copy Channels from anywhere within the software and paste them into the required 'Configuration Structure' in the 'Local Projects'.

A Channel can be added manually to a 'Configuration Structure' using the 'Local Projects' 'right click' menu, the 'Data Items' panel 'right click' menu or the New Channel toolbar icon as shown below.



The 'New Instrumentation Item' window is shown below.



Warning:
Channels on an 'Instrumentation' bus require an Influx Technology H Box in which to function. The Rebel data logger internal instrumentation board (if specified) is accessed by connecting the external H Box for thermo-couple and analogue inputs.

Channel Settings:

- Label—Allows the user to specify the name for the ‘Channel’.
- Units—Specifies the units for the ‘Channel’.
- Min Value—Designates a minimum value for the data.
- Max Value—Specifies a maximum value for the data.

Memory Layout:

- Data Type—Drop down menu selects the data type.
- Size (bytes) -
- Channel—Drop down menu selects the required hardware channel.
- Precision—Displayed decimal places.
- Byte Order—Endian format.
- Start Bit— Not used.
- Bit Count—Not used.
- Output Ident—Specifies the Hexadecimal label for the output.
- Assign Ident—Allows the user to assign the identifier.

Conversion Method:

- Formula/Table—Allows the user to select between a formula or a predefined ‘Conversion Table’.

Formula:

- Coeff A—Specify coefficient A in the formula type displayed.
- Coeff B—Specify coefficient B in the formula type displayed.
- Coeff C—Specify coefficient C in the formula type displayed.
- Coeff D—Specify coefficient D in the formula type displayed.
- Formula—Displays the created formula.

The window also contains a ‘Default’ button which allows all settings to be automatically returned to their original states.

Once the required settings for the Address have been entered, clicking ‘OK’ automatically closes the window and adds the Address to the ‘Data Items’ panel. The ‘Data Item’ can be identified as an Address by the icon appearing at the beginning of the item row

5—Rebel Data Loggers

5.1—Introduction

The Rebel data loggers are a family of very powerful tools capable of complex data logging applications. Boasting up to 5 CAN buses, Digital Inputs and Instrumentation including analogue and thermocouple inputs, the Rebel Loggers are capable of logging from multiple sources utilising different protocols simultaneously.

The Rebel Loggers also supports USB, Ethernet, GPRS and Bluetooth connections and GPS and Accelerometer capability.

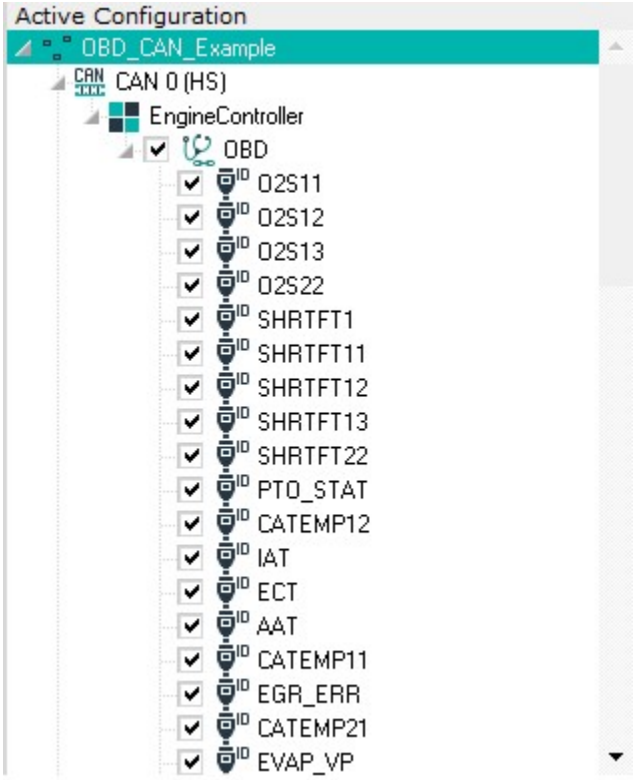
Interfacing seamlessly with the DiaLog software package, all the Rebel Loggers functionality is easily accessed. This section considers the features which are active with a Rebel data logger connected to DiaLog.

Some of the Rebel Loggers are pictured below:

This section assumes the user is working with the USB connection established, however the features are also available with alternative connection methods.

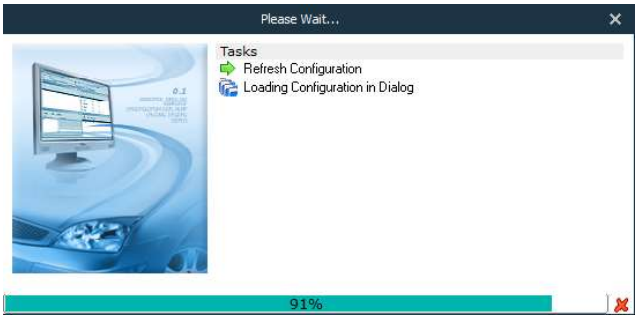
5.2—Active Configuration

Within the ‘Database’ panel on the left hand side of the software window there is the ‘Rebel’ tab, this tab displays the ‘Active Configuration’ panel as can be seen below.



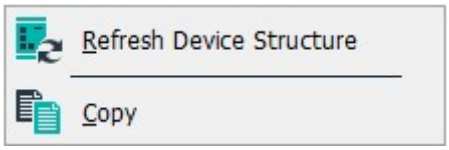
The ‘Active Configuration’ panel is designed to display the current condition of the Rebel data logger and allows the user to interact with the device in a number of ways.

Ensure the Rebel is connected. Once connected DiaLog will automatically read the Rebel data logger and update the ‘Active Configuration’ panel displaying the ‘Progress’ window below.



As can be seen the ‘Configuration Structure’ is displayed in an analogous manner to the ‘Local Projects’ panel. This allows simple and familiar navigation of all the components of the ‘Configuration Structure’ currently active on the Rebel.

The ‘Active Configuration’ panel also contains a toolbar at the top of the panel and a ‘right click’ menu as can be seen below.



- Refresh Active Configuration—This allows the user to instruct DiaLog to read the ‘Active Configuration’ from the device.
- Copy—This provides the user the facility to create a duplicate of any part of the ‘Configuration Structure’ to place in an alternative ‘Project’ in the ‘Local Projects’ panel.

As in the ‘Local Projects’ panel upon highlighting an item within the ‘Configuration Structure’ a summary of the details of the item are displayed in the ‘Properties’ panel.

5.3—Live Rebel Connection

5.3.1—Introduction

With Rebel connected to DiaLog, it is also possible for the device to be simultaneously connected to the vehicle/module it is configured to data log. Upon connection of the Rebel to the vehicle it will automatically configure itself and begin data logging from the vehicle.

In this situation a number of features are enabled and these are considered in this section. A summary of the section is shown below.

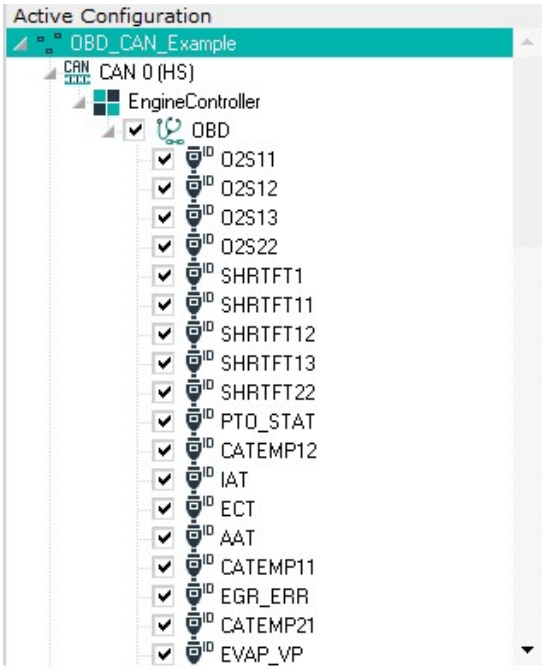
5.3.2—Data Logging Control

With the Rebel connected to both DiaLog and a vehicle it is possible to use DiaLog to control whether it is data logging. This is achieved through the toolbar at the top of the software window as shown below.

- Start - Allows the user to instruct the Rebel device to commence data logging.
- Send Configuration to the Logger - Allows the user to, in one process, update the Rebel device with the selected 'Configuration Structure' from the 'Local Projects' panel and automatically configure the Rebel and commence data logging.
- Stop -Allows the user to instruct the Rebel to cease data logging

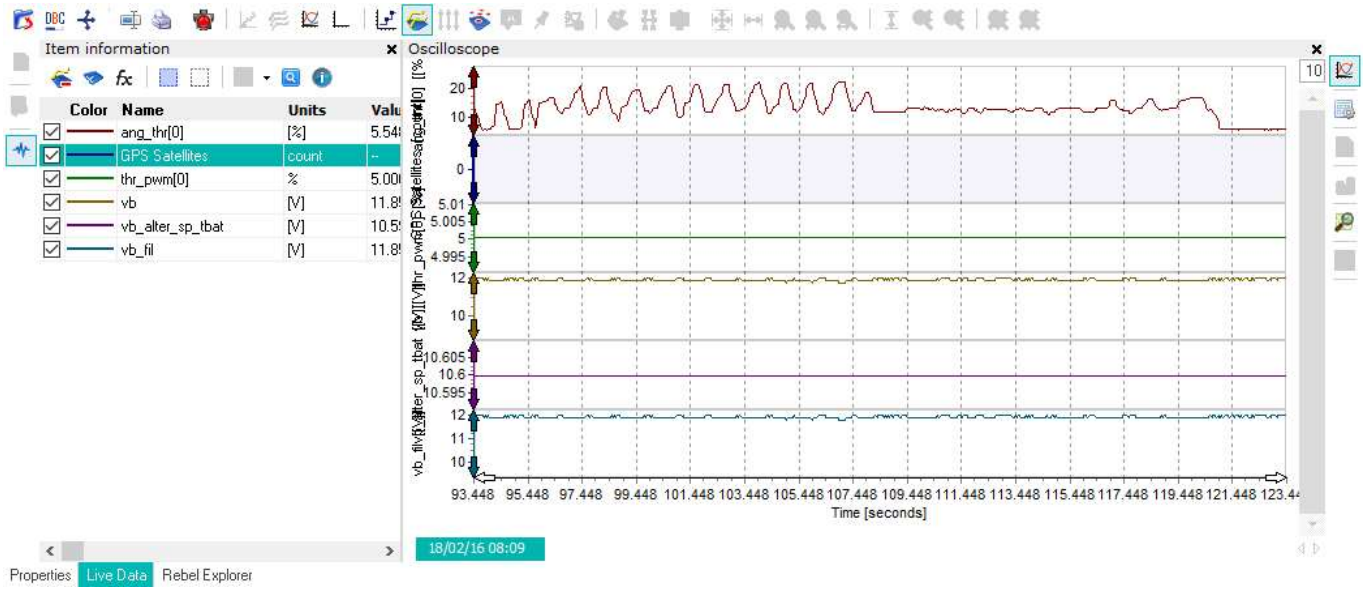
5.3.3—Live Data

With the Rebel simultaneously connected to DiaLog and logging from a vehicle it is possible to use DiaLog to monitor the data being recorded in real time. This is called ‘Live Data’ and is initiated using the ‘Active Configuration’ panel as seen below.



To display ‘Live Data’ for an item in the ‘Configuration Structure’, select the item to be displayed by ticking the appropriate satellite box for this item.

Upon ticking the satellite box of the required ‘Data Items’ DiaLog automatically adds the items to the ‘Live Data’ panel as can be seen below.



The ‘Live Data’ tool is largely analogous to the ‘Oscilloscope’ tool featuring most of the same functionality. The tool is controlled by the toolbar as shown below.

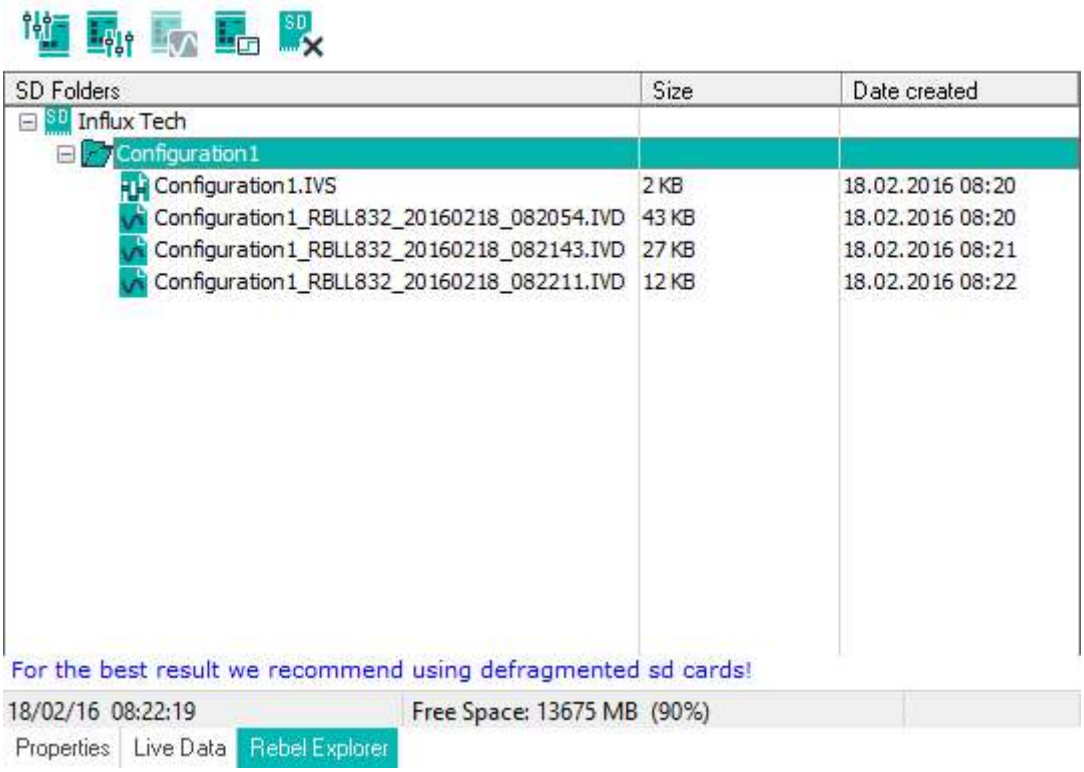
Plotting Live Data

Once the required ‘Data Items’ have been added to the ‘Live Data’ tool, the user must instruct plotting to begin.

 Allows the user to start and stop plotting of the ‘Data Items’.

5.4—Rebel Data Logger

With the Rebel connected to DiaLog there are a number of tasks that can be performed using the software. Some Important Functions are accessed using the 'Rebel Explorer' Section of the Logger Tab, which opens the following panel as shown below:



As can be seen the window displays the current content of the SD Card in the Rebel. Each folder contains all the files related to a specific 'Configuration Structure'. Each folder then contains an .IVS file which is the actual 'Configuration Structure' and any number of .IVD data files. These represent the data logged from the vehicle, with a data file created at the beginning of every new logging session.

Uploading a new 'Configuration Structure'

Allows the user to upload the selected 'Configuration Structure' from the 'Local Projects' panel to the Rebel data logger and automatically set it as active.

Downloading a 'Configuration Structure'

Allows the user to download the selected 'Configuration Structure' from the SD Card in the Rebel data logger into the open 'Project' in the 'Local Projects' panel.

Retrieving Data Files

Allows the user to retrieve data files directly from the Rebel.

Formatting the SD Card

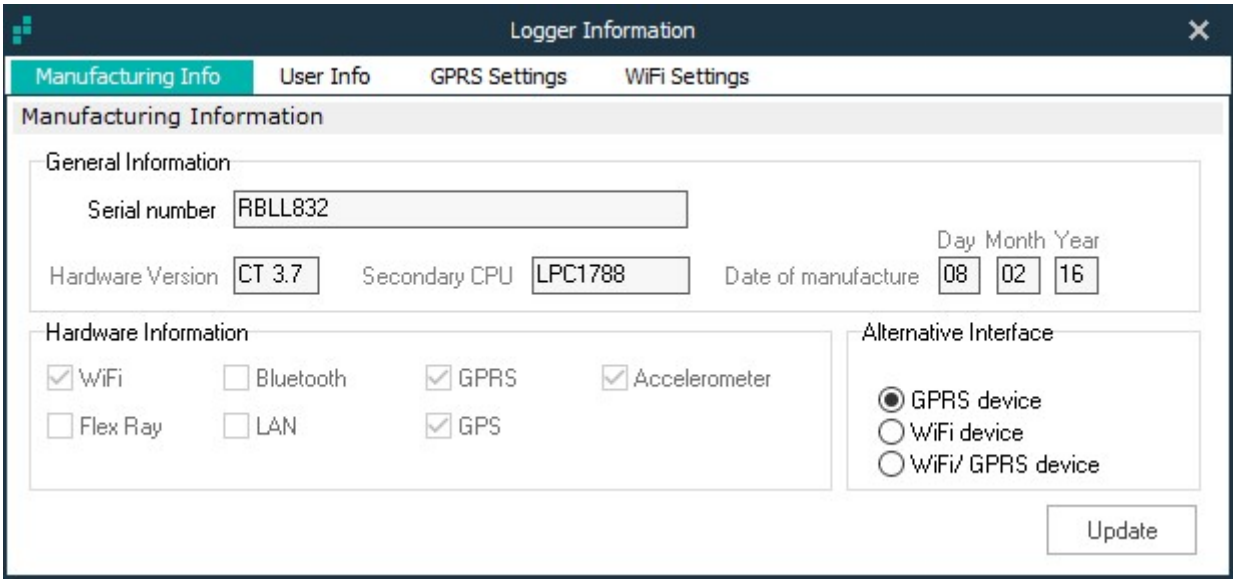
Provides the facility to use the Rebel data logger to format the inserted SD Card. Also provides the option of preserving or deleting the active 'Configuration Structure'. This allows the card to be cleared of unwanted .IVS and .IVD files without effecting the active 'Configuration Structure' or associated data files.

Setting the Rebel Time and Date

Opens a dedicated window which allows the user to manually configure the time and date settings for the internal Rebel clock.

Rebel Data Logger Information and Settings

Gives the user access to a summary of all the details for the Rebel as displayed in the window shown below. The window opens with the 'Manufacturing Info' tab open as default.



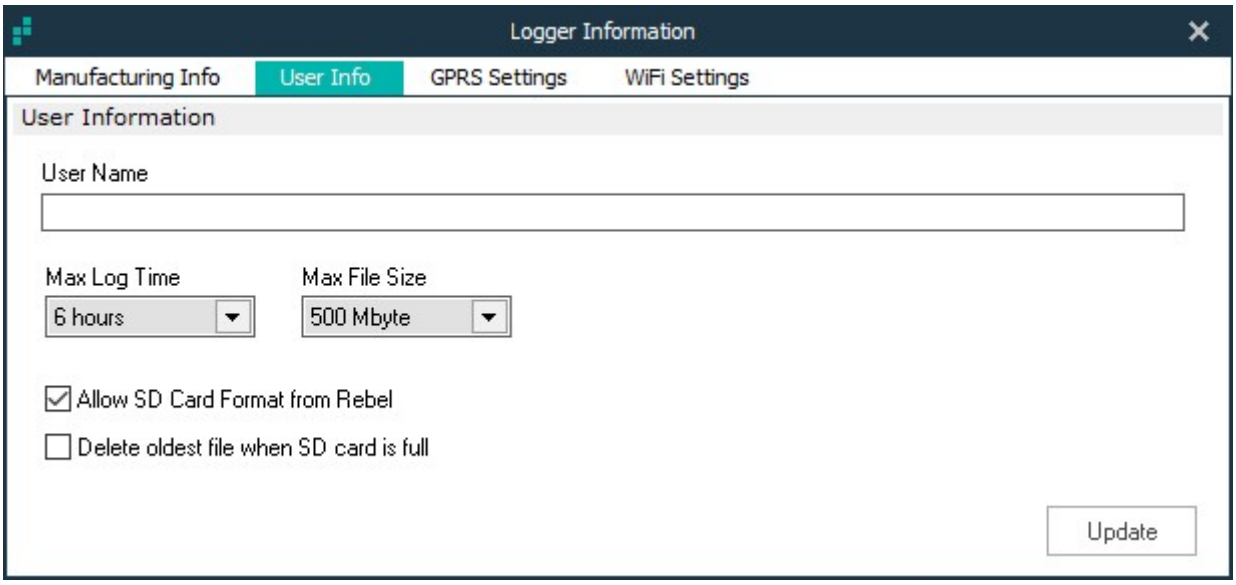
Manufacturing Information:

General Information:

- Hardware Version—Displays the hardware version installed in the data logger.
- Date of Manufacture—Displays the date of commissioning.
- Serial Number—Displays the data logger unique serial number.
- Secondary CPU—Details the Secondary Processor

Hardware Information:

- Accelerometer—Displays if the internal device is installed.
- Bluetooth—Displays if the internal device is installed.
- FlexRay—Displays if the internal device is installed.
- GPRS—Displays if the internal device is installed.
- GPS—Displays if the internal device is installed.
- LAN—Displays if an Ethernet port is present in the logger.
- WIFi—Displays if an WiFi radio is present in the logger

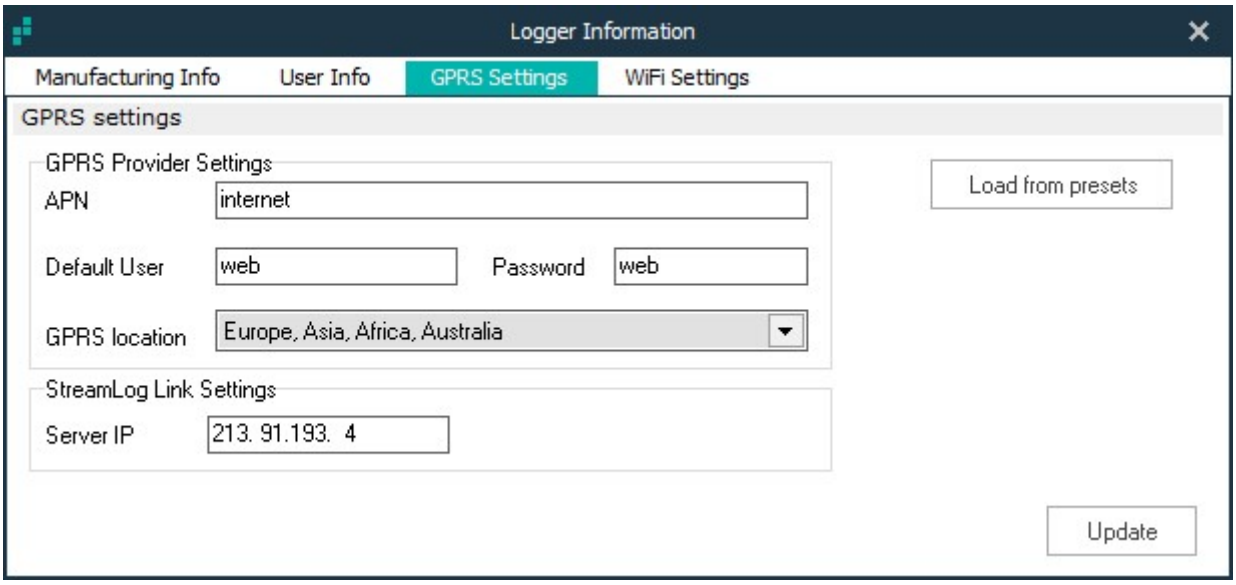


User Information:

User Info:

- User Name—Your Name.
- Max Log Time—Maximum length of recordings, after reaching this length of time a new file will be created.
- Max File Size—Maximum size of recordings, after reaching this size a new file will be created.
- Allow SD Card Format from Rebel—Allows the Rebel to format the card.
- Delete oldest file when SD card is full—If set when the SD Card is full the oldest recording will be deleted when space is required for new recordings.

The window also contains an ‘Update’ button which allows the settings to be sent to the Logger.



GPRS Settings:

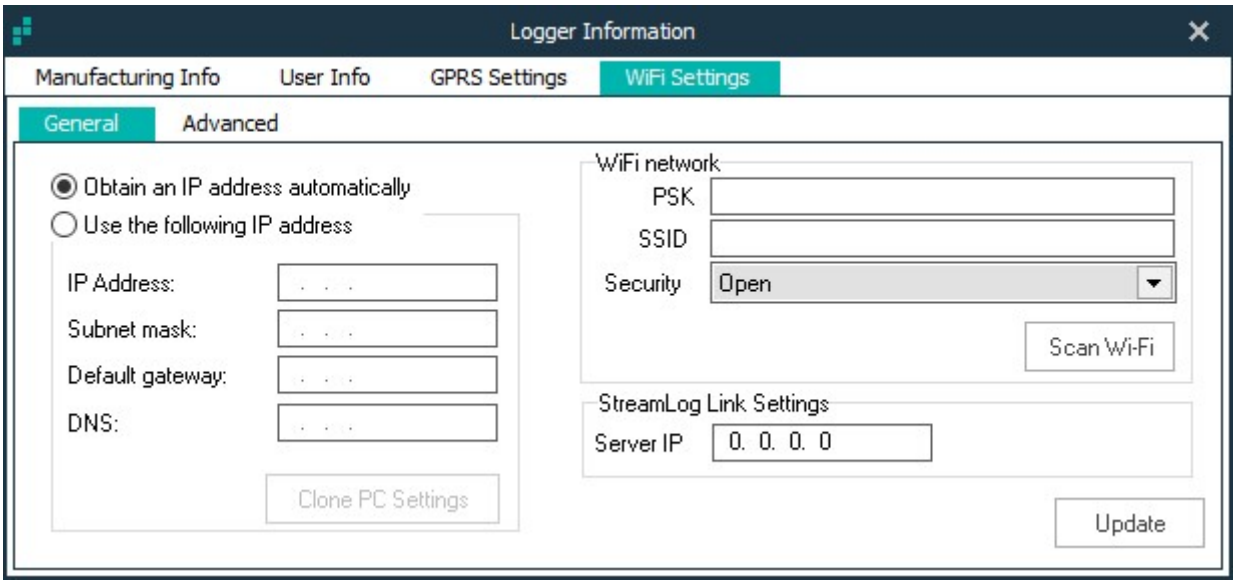
GPRS Provider Settings:

- APN—The Access Point Name for the Gateway from the GPRS network to the internet.
- Default User—The username.
- Default Password—The password

The GPRS Provider Settings may also be loaded from presents if available.

StreamLog Link Settings:
Server IP—The IP Address of the StreamLog Server you wish to use.

The window also contains an 'Update' button which allows the settings to be sent to the Logger.



WiFi Settings:

IP Address Settings:

- Obtain an Ip address automatically—The IP Address, Subnet Mask, Default Gateway and DNS Server addresses will all be obtained via DHCP
- Use the following IP address—Used to manually assign the IP Address, Subnet Mask, Default Gateway and DNS Server addresses.

WiFi Network Settings:

- PSK—The pre shared key
- SSID—The service set identifier (name of the WiFi Network)
- Security—The level of encryption you wish to use

Clicking Scan WiFi will allow you to select the WiFi Network for those that are in range, this will allow you to correctly set the SSID and Security level automatically

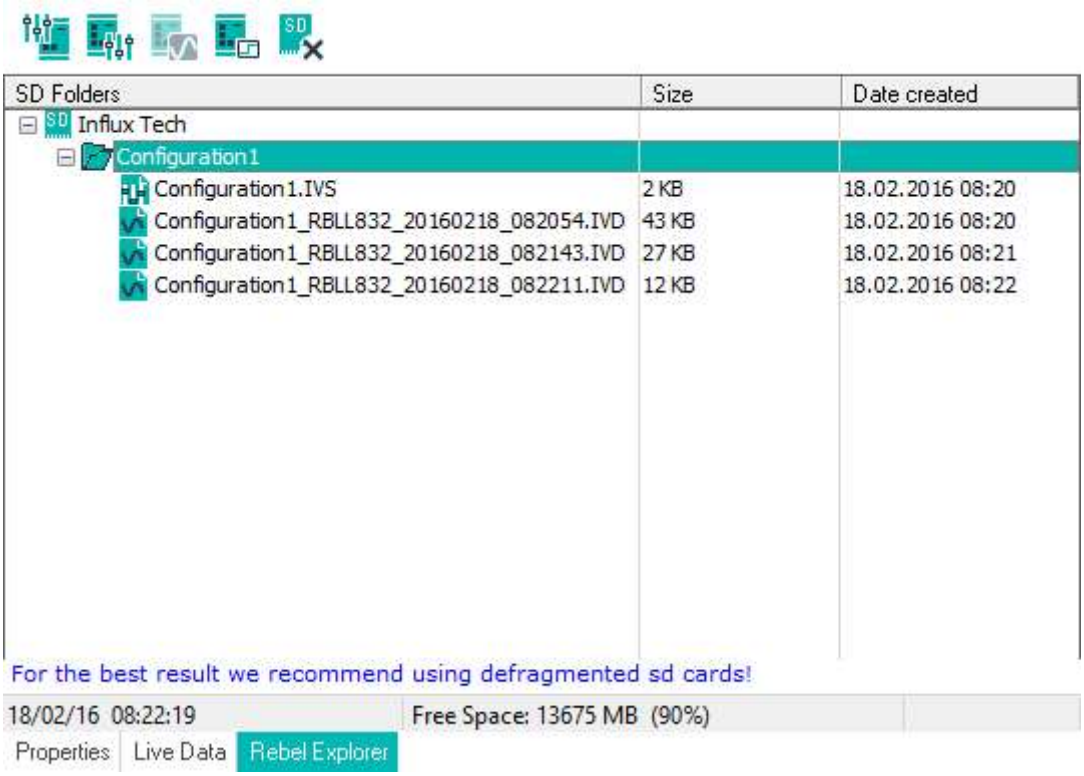
Advanced Tab:

The Advanced Tab contains settings to allow Extensible Authentication Protocol encapsulation to be configured, it also allows a proxy server to be configured.

The window also contains an ‘Update’ button which allows the settings to be sent to the Logger.

5.5—SD Card

DiaLog has the ability to interact with an SD card independently of the Rebel data logger. This allows SD cards to be edited in a separate location to the data logger and used to remotely configure any Rebel. With an SD card inserted in the card reader, the features are accessed through the 'Rebel Explorer' on the Logger Tab which opens the window shown below.



As can be seen the window displays the current content of the SD Card in the Rebel. Each folder contains all the files related to a specific 'Configuration Structure'. Each folder then contains an .IVS file which is the actual 'Configuration Structure' and any number of .IVD data files. These represent the data logged from the vehicle, with a data file created at the beginning of every new logging session.

Uploading a new 'Configuration Structure'

Allows the user to upload the selected 'Configuration Structure' from the 'Local Projects' panel to the Rebel data logger and automatically set it as active.

Downloading a 'Configuration Structure'

Allows the user to download the selected 'Configuration Structure' from the SD Card in the Rebel data logger into the open 'Project' in the 'Local Projects' panel.

Retrieving Data Files

Allows the user to retrieve data files directly from the Rebel.

Formatting the SD Card

Provides the facility to use the Rebel data logger to format the inserted SD Card. Also provides the option of preserving or deleting the active 'Configuration Structure'. This allows the card to be cleared of unwanted .IVS and .IVD files without effecting the active 'Configuration Structure' or associated data files.

Provides the facility for the user to fully format the selected SD Card, removing all data from the SD card.

Warning:
All new SD cards must be formatted **in the Rebel** prior to use. This is performed using the Rebel Explorer.

Note:
Configuration Structure priorities between the Rebel and SD card—An active structure on an SD card will always take priority over the Rebel. However, if a blank SD card is inserted into a Rebel with a structure on-board this will automatically be loaded to the SD card.

Note:
If the 'Delete oldest file when SD card is full' setting in the User Info section of the Logger Information is unchecked, and the SD card becomes full, the Rebel will stop logging. This feature ensures no data can be overwritten before it has been retrieved. The data can either be cleared or a new formatted SD card inserted and the Rebel will automatically continue logging.

6—Data Retrieval and Handling

6.1—Introduction

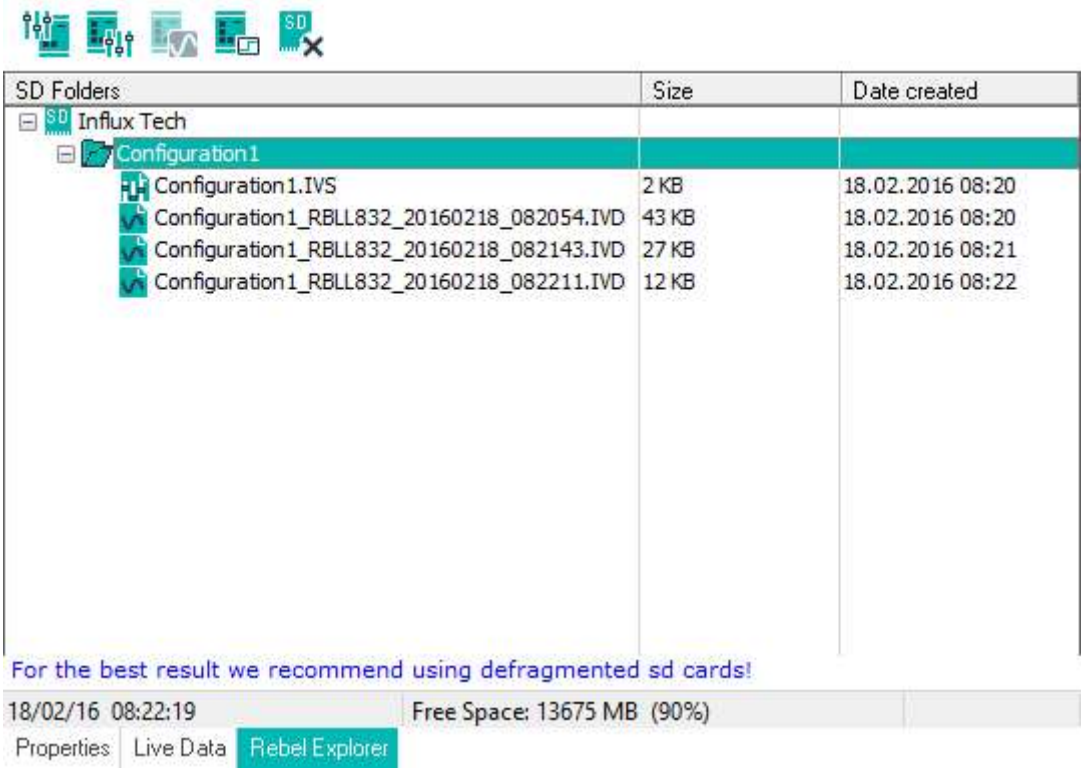
This section covers all the possible methods of retrieving data recorded by the Rebel data logger. This includes directly from the Rebel and from the SD card using both DiaLog and Windows.

Data handling is then covered including data import and export options along with file merging and conversion methods to a number of different file formats.

6.2—Data Retrieval from a Rebel

This section details the method which allows the retrieval of data files directly from the Rebel when online and connected to DiaLog.

The data retrieval is performed using the 'Rebel' window which is accessed using the 'Rebel' toolbar icon. Which opens the 'Rebel' window as shown below.



Retrieving Files from the Rebel Data Logger

It is possible to retrieve any file(s) from the current SD Card in the Rebel by highlighting the required file and utilising either the 'right click' menu or 'Get Files' toolbar icon.

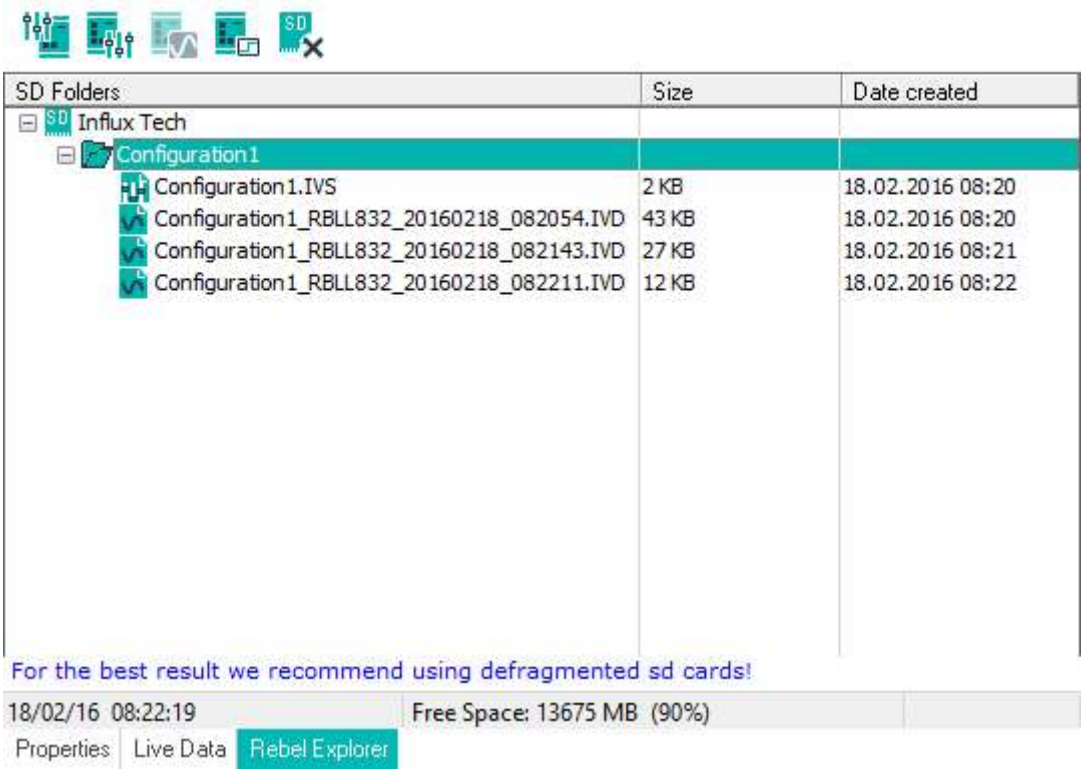
This allows the user to save any required files from the Rebel data logger SD Card, directly on to their system. Once the file has saved, DiaLog will prompt whether the user wishes to import the retrieved data file into the 'Analysis' section of the software automatically.

6.3—Data Retrieval from an SD Card

The Rebel utilises the FAT32 file system to write the recorded data to the SD card meaning that the card is directly accessible from Windows.

As such there are two methods for accessing the data on an SD card. The first method utilises Windows to explore the SD card as with any other media storage and save the data files directly to the computer. Data retrieved with this method can then be imported using the 'Analysis' section of DiaLog.

The second method involves utilising the 'Rebel Explorer' section directly to locate the files on the SD card as can be seen below.



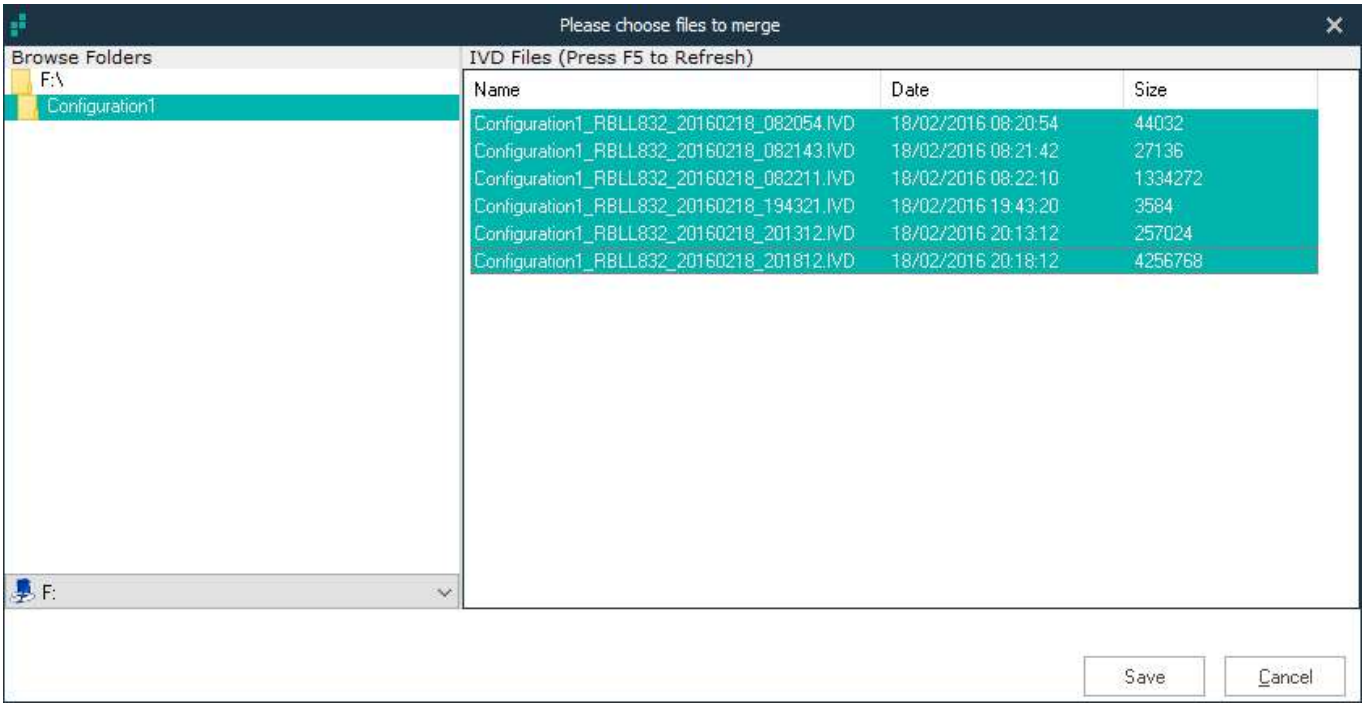
6.4—Data Handling

6.4.1—Merging Multiple Data Files

DiaLog contains a feature which allows the user to select multiple .IVD data files to be merged into a single .IVD data file. This allows data files that are created using the same 'Configuration Structure', perhaps consecutive logging sessions over a period, to be merged into a single file covering the entire period to aid analysis.

The facility is accessed using the Analysis Table by clicking the Merge IVD Files Button.

The 'Merge IVD Files' button opens a dedicated window as shown below:

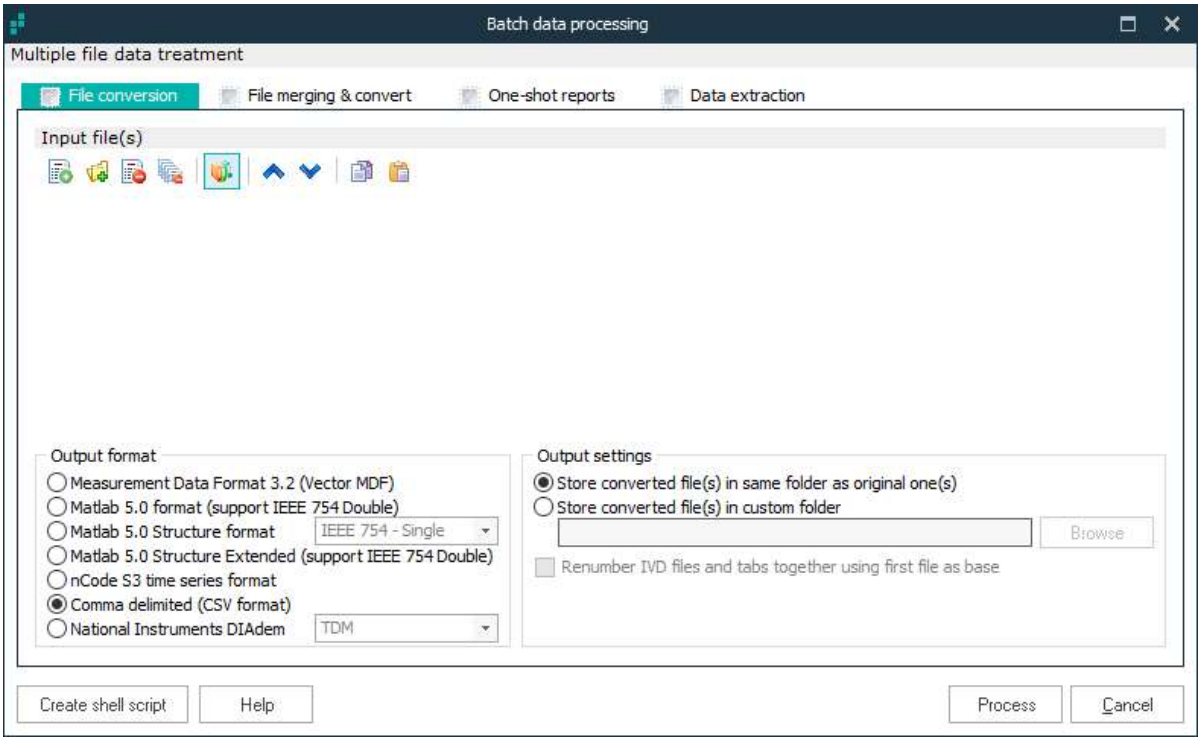


- Using the drop down menu at the bottom of the window select the drive—this will open in the panel.
- Navigate to the required directory in the 'Browse Folders' panel—this will open in the 'IVD Files' panel, displaying any .IVD files present.
- Select the required data files to be merged.
- Click 'Save' to select the location for the merged file and begin the process—this may take some time depending on the number and size of the files.

6.4.2—Exporting Data Files to Alternative File Formats

All data recorded by a Rebel is stored in a dedicated .IVD file format. However, this is not directly compatible with alternative data analysis software. DiaLog therefore contains a tool which allows .IVD data files to be exported to a number of alternative file formats for import into other software.

This facility is accessed by the 'Batch Processing' button on the Analysis Tab, which opens a dedicated window as shown below.



The tool contains the ability to individually convert multiple files to the same format or to simultaneously merge and convert the data to a single file. The tab of the window allows individual file conversion.

Output format:

- MDF—binary measurement data storage file format.
- MATLAB 5.0—supporting 64bit floating point precision.
- MATLAB 5.0 Structure—supporting either 32bit or 64bit floating point precision.
- MATLAB 5.0 Structure Extended—supporting 64bit floating point precision.
- nCode S3 time series format
- CSV—Comma separated variables.
- TDM—National Instruments DIAdem

Output settings:
Selects the location the processed file(s) will be stored to

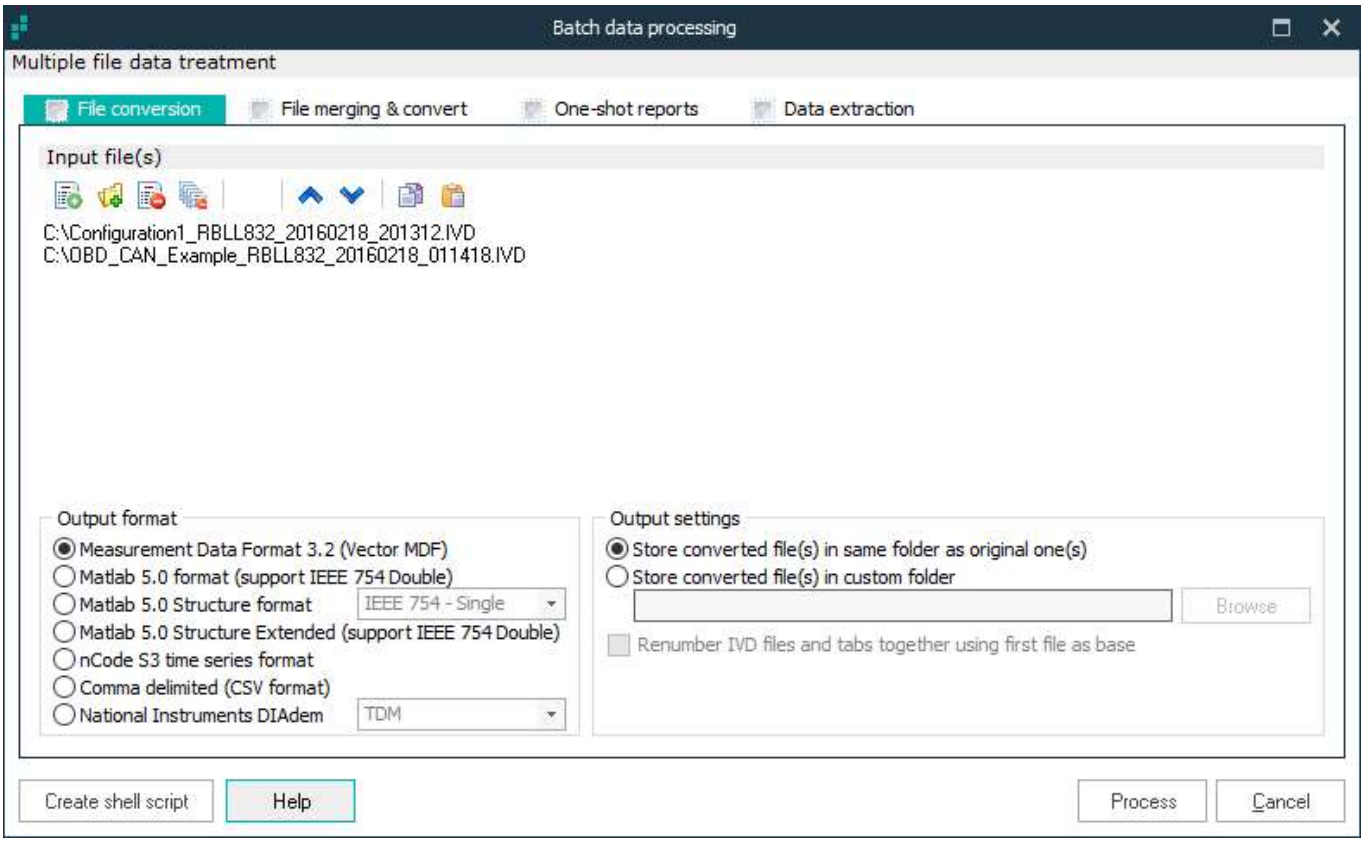
The conversion panel has two options. The first only permits files recorded with the same 'Configuration Structure' to be converted. This allows the user to select specific 'data items' only to be exported to the converted files.

- Using the 'Add Files' or 'Add Folders' button locate and import the required data files.
- Select the required 'data items' to be exported.
- Select the location for the exported files, either the same folder or 'browse' for an alternative.
- Select the required output format for the files.
- Click 'Export' to close the window and begin the process.

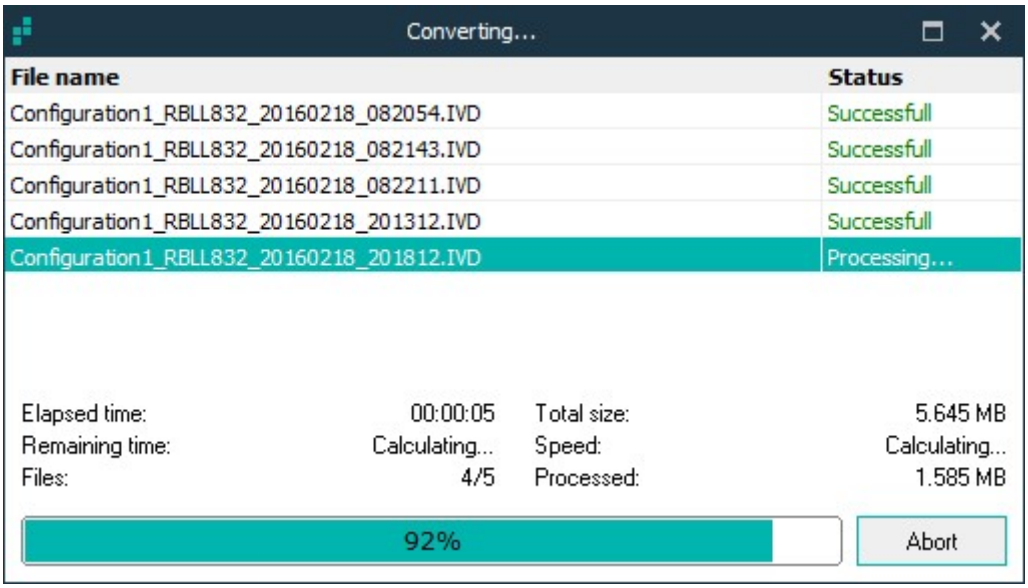
The second option allows the user to convert IVDs created with different 'Configuration Structures' simultaneously. Due to this only the complete data file can be exported and individual 'data items' cannot be selected.

 Toggles between single and multiple ‘Configuration Structure’ option.

With the matching ‘Configuration Structure’ filter off, data files recorded with different structures can be selected as shown below.



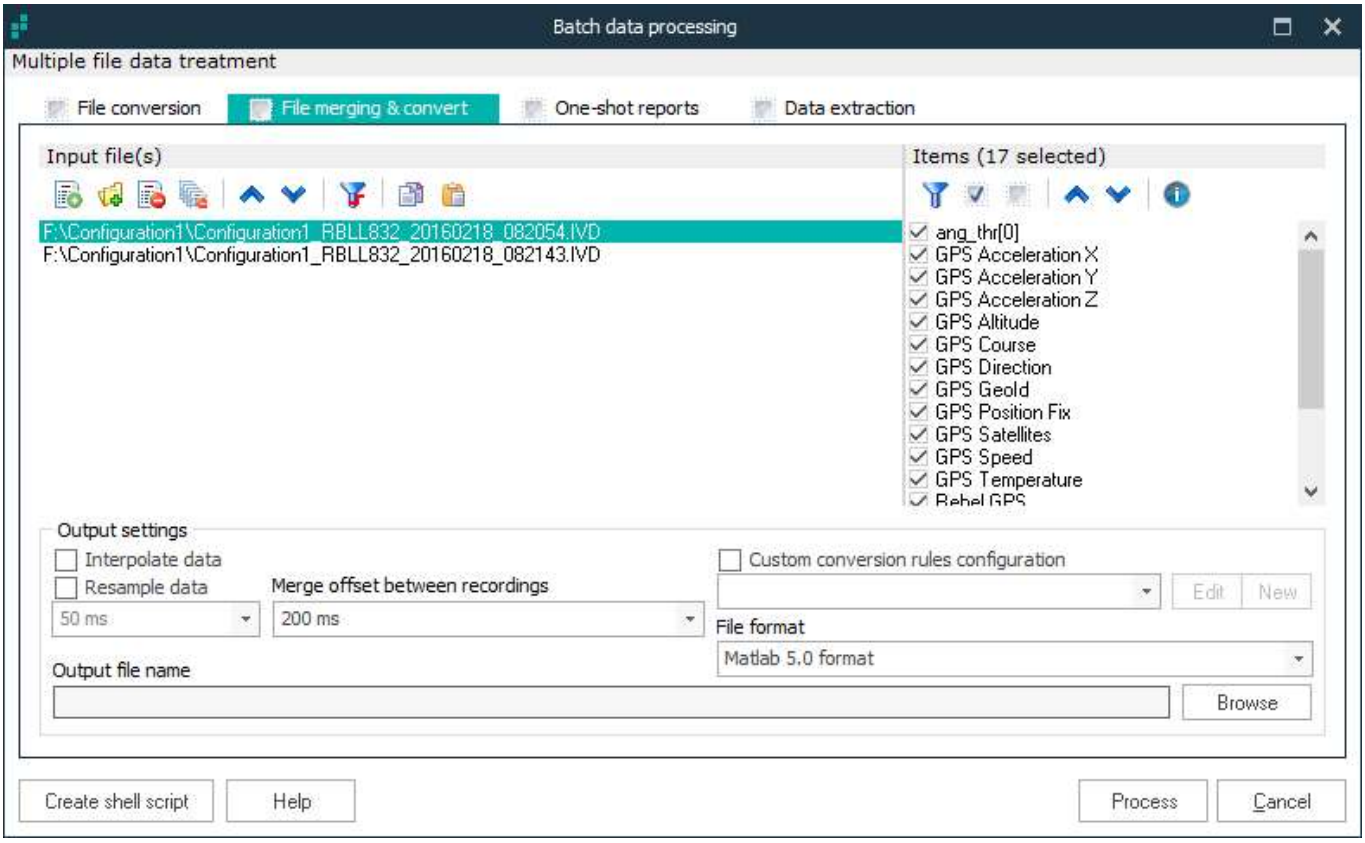
Once the process has been started the window below displays the progress.



The window shows show key statistics for the conversion process along with a completion percentage bar.

The window also allows the user to completely cancel the conversion process by aborting the ‘Converting’ progress window.

The second tab contains the merge and convert functionality:



Items:
Allows the user to select specific items within the chosen IVD files to process into the output file.

Output settings:

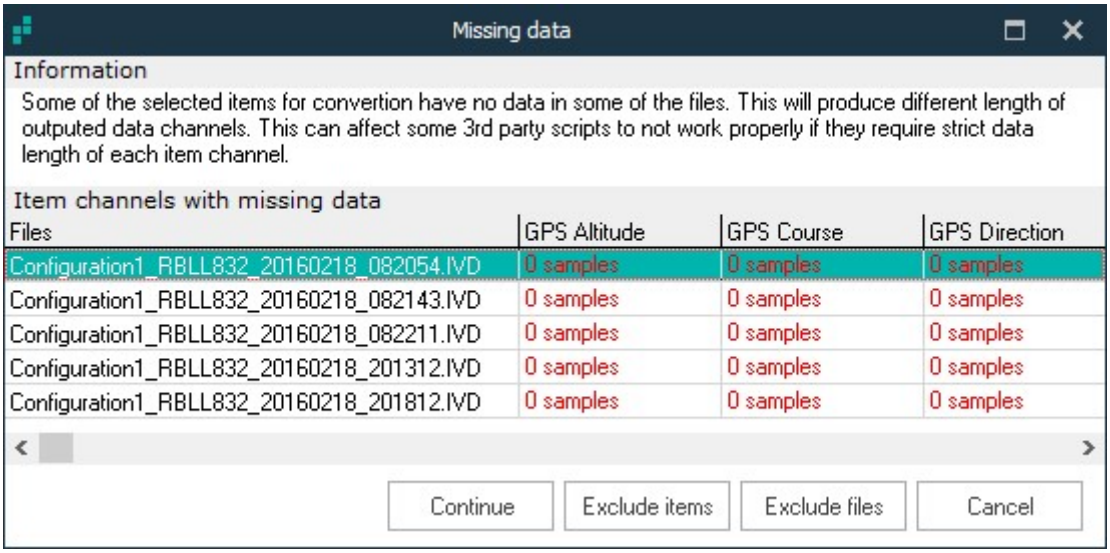
- Interpolate data—selects to use interpolation when merging files at the selected rate.
- Last sample every—opts to insert the last recorded data value at the selectable frequency.
- Point offset—specifies the number of interpolation points between input files.
- Offset between recordings—interprets the interpolation rate and point offset into time.
- Using the 'Add files' or 'Add folder' button locate and import the required data files.
- The 'Up' and 'Down' arrows can be used to alter the order the files will be merged in.
- The 'Data Items' from the data files to be processed can be selected if only a sub-group are required. The data items can also be selected by importing a filter file, the arrows allow order selection.
- Using the 'Output settings' select the required output format and file name and the interpolation and merging offset. The offset is the number of interpolation point's gap and therefore must be a multiple.
- Click 'Process' to begin the merge and convert procedure.

The data selected to be exported can be defined around individual trigger events.

 Opens a new panel listing all the trigger events, allowing pre and post trigger timing definition, as shown below.

To export only data around each trigger event, the user can define pre and post-trigger periods of data for each trigger, which is selected to be exported using the satellite box.

If the process is ran using interpolation, it is possible that some files may contain no data or different sample counts in some channels. In this instance the tool will prompt the user with the window shown below.

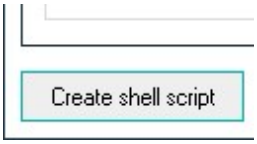


The window provides the user four options to proceed:

- Continue—Continue merged conversion unchanged.
- Exclude Items—Remove problematic items and continue.
- Exclude Files—Remove problematic files and continue.
- Cancel—Abort current batch merging process.

Create a Batch Exporting Script

The tool also allows the user automatically create a batch script to perform the selected data processing. This allows large volumes of data to be processed in one go.

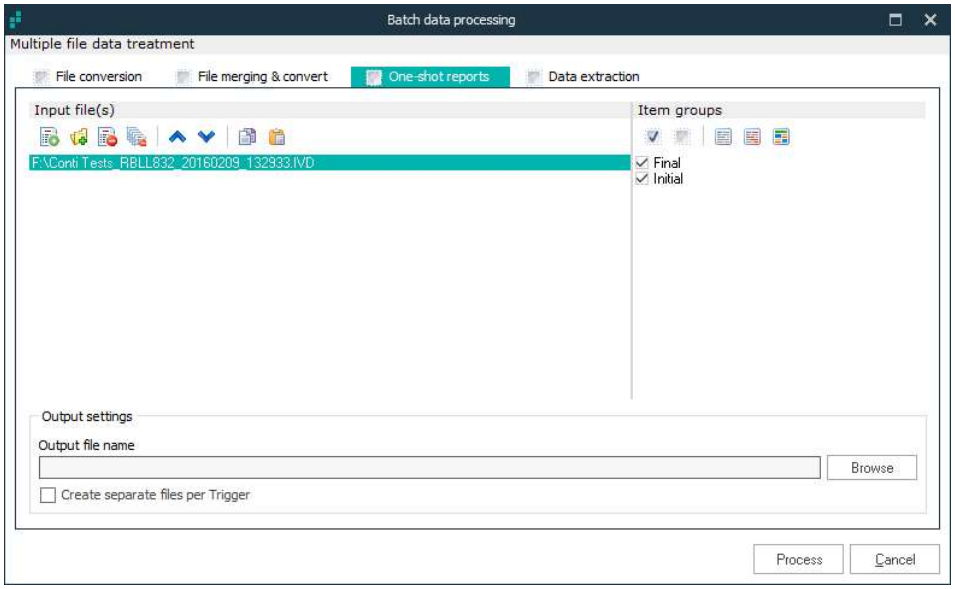


Allows the user to create a save a Batch file, containing all the data processing settings selected in the tool. All settings must be selected in the window before the script is created. To run the created batch file, simply double click the icon.

Note:
For the conversion or merging of large numbers of data files, DiaLog contains a command based version of the tool. Full details of this can be found in the dedicated user guide—Batch conversion and merging guide.

6.4.3—Exporting Multiple Event Reports

All ‘Trigger events’ which occur during a logging session are stored in the IVD file. The ‘events' can then be exported to a summary report. DiaLog contains a tool which allows the user to export multiple Event reports to a single report. This facility is accessed by the ’Batch Processing’ button on the Analysis Tab, which opens a dedicated window as shown below, and then selecting the One Short Report Option:



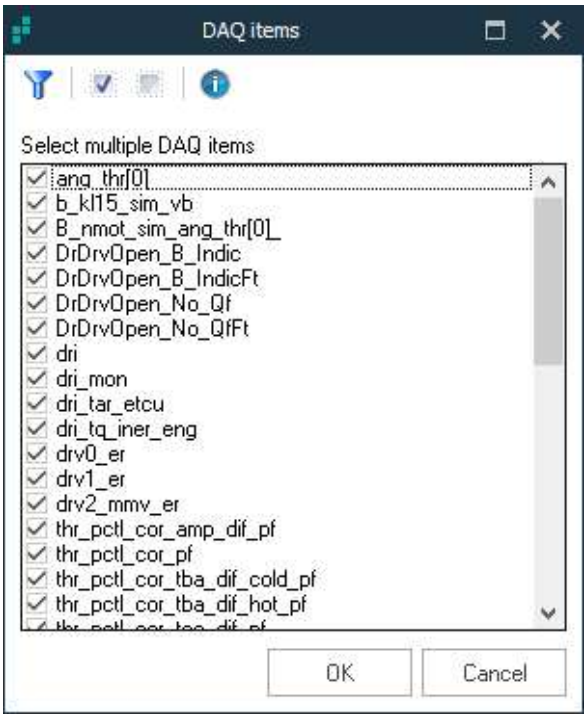
Item groups:

Allows the selection of the recorded trigger events contained within the listed data files to be exported in the report.

The panel also provides the option to append additional data into the report.

Adds all additional data recorded in the IVDs to the report.

Allows the user to select specific data items from the loaded IVDs to append to the report. Opens a dedicated window shown below.

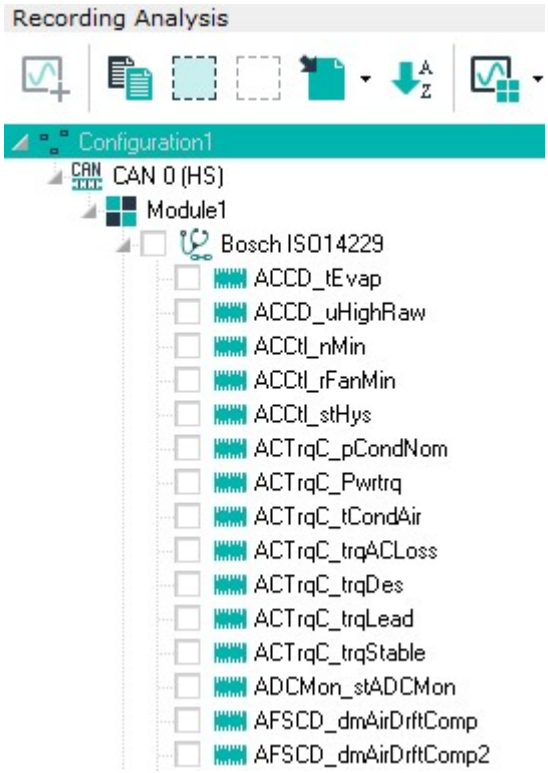


- Using the ‘Add files’ or ‘Add folder’ button locate and import the required data files.
- Select the location for the exported files using the ‘browse’ button.
- Select whether to export each event list to a separate file with the satellite button.
- Click ‘Process’ to close the window and begin the process— the status of the export is indicated in the ‘Status Message’ panel

7—Data Analysis

7.1—Introduction

DiaLog contains a powerful suite of data analysis tools to enable the user to quickly and intuitively assess the data recovered from the Rebel. The data analysis functionality of DiaLog is accessed via the 'Analysis' tab as shown below. In this case an .IVD data file recorded using an example 'Configuration Structure' is displayed in the 'Recording Analysis' panel.



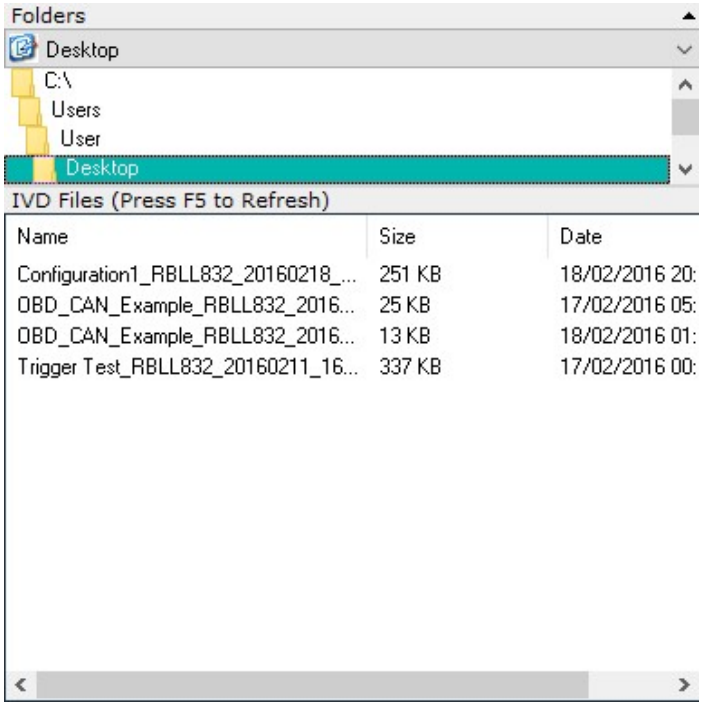
The 'Recording Analysis' panel displays any imported .IVD data files in an analogous manner to the 'Configuration Structure', enabling quick and familiar navigation of the data.

Importing a Data File

To import a data file into the 'Recording Analysis' panel there are a number of methods, the file can be retrieved from the Rebel data logger or the file can be imported manually from a saved location, or an SD card.

To manually import a data file into DiaLog there are two possible methods. Firstly use the Import Tab and select Import Recorded Data

The second method uses the dedicated 'Import Panels' found on the right hand side of the software window when the 'Recording Analysis' panel is open:



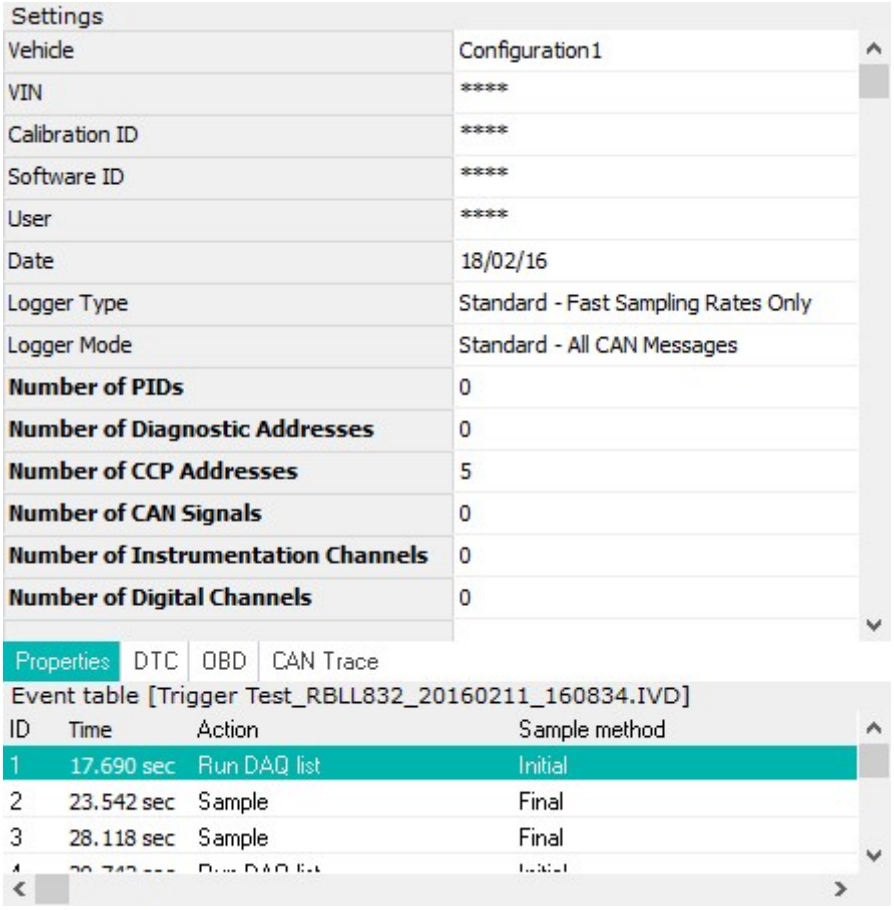
The 'Import Panels' allow the user to locate and import the required data file into DiaLog.

- Using the drop down menu at the bottom of the panels select the drive—this will open in the bottom panel.
- Select the required directory in the bottom panel—this will open displaying the files in the top panel.
- 'Double click' the required file to import into the 'Recording Analysis' panel.

This process allows the efficient working between multiple data files and simplifies the import process.

Once a data file has been successfully imported into the 'Recording Analysis' panel, a summary of each item in the displayed 'Configuration Structure' can be displayed in the 'Properties' panel by highlighting the required item.

For each data file highlighted in the list, a summary of the trigger events recorded in the file is displayed as shown below.



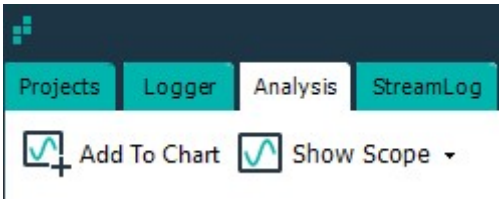
7.2—Oscilloscope

7.2.1—Introduction

The Oscilloscope tool in DiaLog contains all the software's data analysis functionality. There are a number of different ways to access the Oscilloscope.

Opening an Oscilloscope

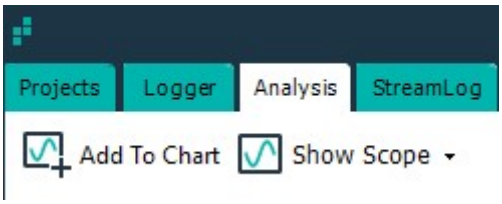
The main method uses the Analysis Tab 'Show Scope' toolbar button as shown below.



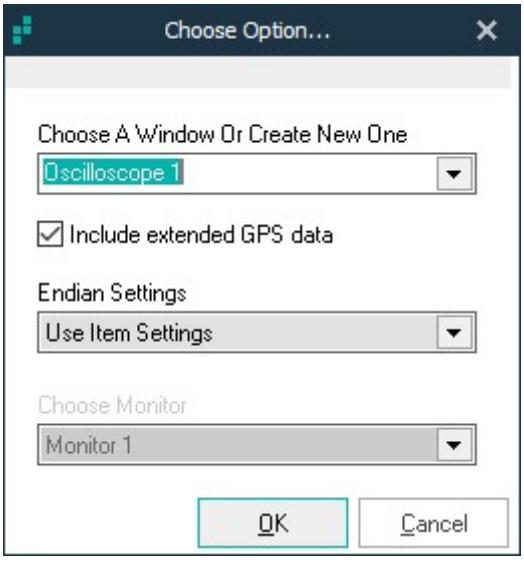
The 'Show Scope' button automatically displays all open Oscilloscope windows, if no Oscilloscope windows exist a new empty Oscilloscope window will be created. The drop down menu from the toolbar icon lists all existing Oscilloscope windows and allows the user to open the required one.

Adding Data Items to the Oscilloscope

The second method for accessing the Oscilloscope window involves adding a 'Data Item' or a selection of 'Data Items' simultaneously to an existing or new oscilloscope. The method uses the Analysis Tab 'Add to Chart' toolbar button as shown below.



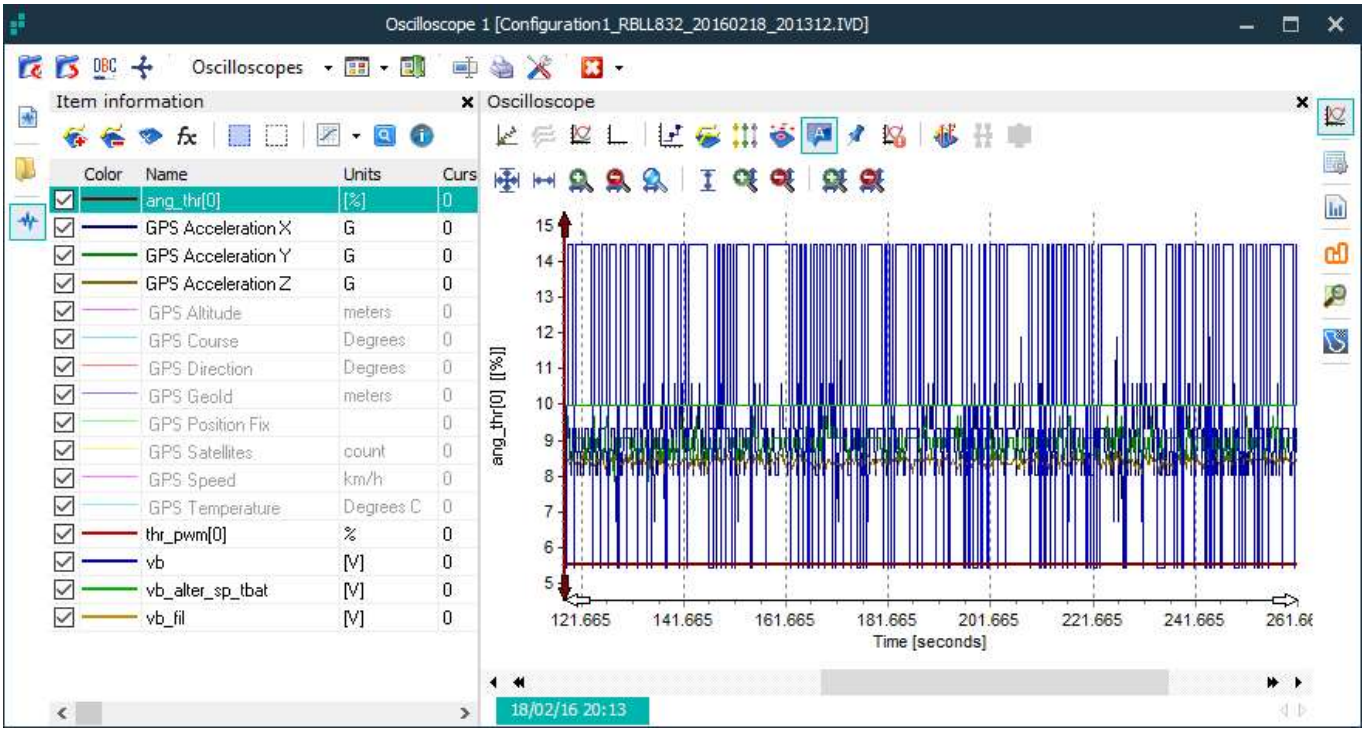
The 'Add to Chart' function is only active once at least one 'Data Item' satellite box has been checked, the items with checked boxes will then be added to the Oscilloscope.



The user is prompted to choose the Oscilloscope to add the 'Data Items' to.

- Choose a Window or Create New One—Allows the user to select and existing Oscilloscope from the drop down menu or type a name to create a new one.
- Endian Settings—Allows the user to select the byte order for the 'Data Items'.

Once the required Oscilloscope has been selected the window will appear as shown below.



The window contains three tabs, found on the right hand side of the window, which allow the user to access the different sections of the data analysis functionality.

7.2.2—Oscilloscope Functionality

7.2.2.1—Introduction

The 'Oscilloscope' window contains two main sections, the 'Information' panel on the left hand side and the 'Main' panel on the right hand side which provides three different features. Each are considered separately below.

The 'Oscilloscope' window is controlled by three separate toolbars, the main window toolbar is considered below.

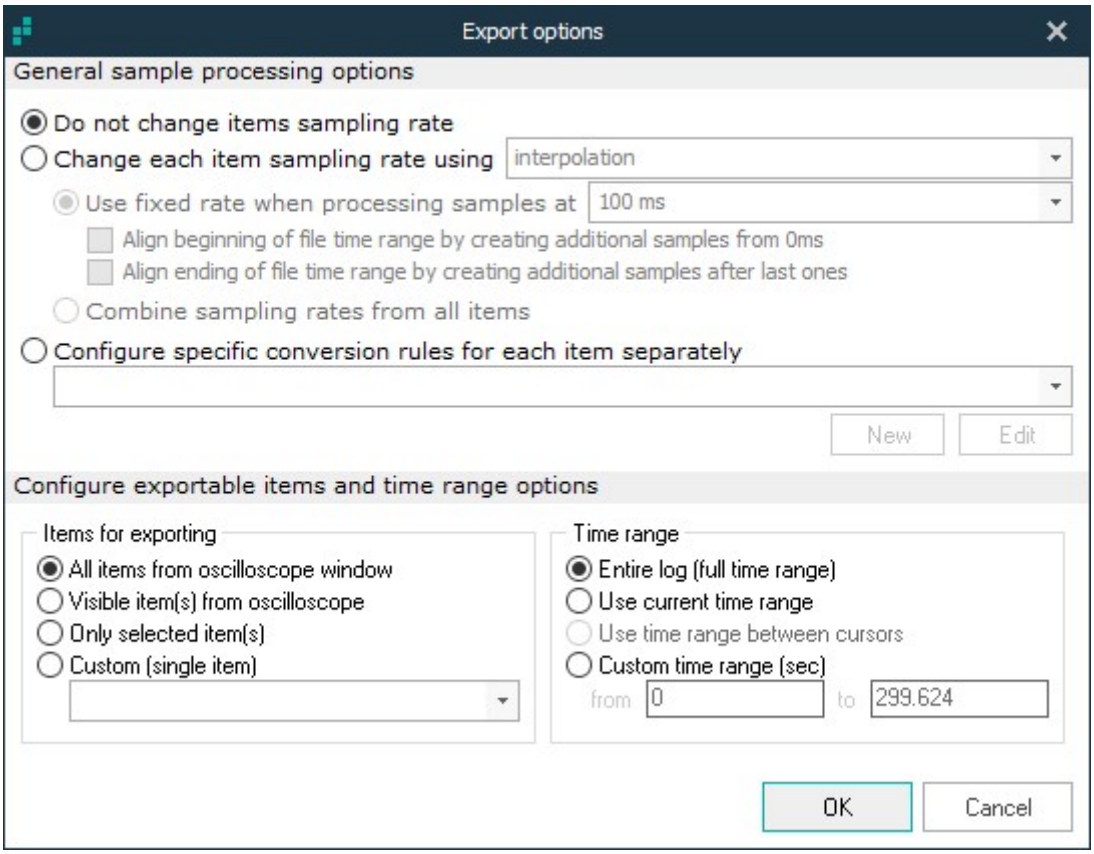
1 Load File to Oscilloscope—Allows the user to select an .IVD data file to import.
2 Export Current Oscilloscope Signals Set—Allows the user to export the current Oscilloscope as a .DAT file.
3 Import Signal Definitions from DBC
4 Import MUX Information from DBC
5 Show Another Existing Oscilloscope—Drop down menu displays all existing Oscilloscopes to open
6 Load Oscilloscope Template—Allows the user to import a pre-created template of an Oscilloscope.
7 Save Oscilloscope Template—Allows the user to save the current Oscilloscope as a template file.
8 Edit Name of Current Oscilloscope Signals Set—Allows the current selection of items to be grouped and named.
9 Print Oscilloscope—Allows the user to print the current display in the Oscilloscope.
10 Adjust General Oscilloscope Settings—Opens a dedicated window considered in detail below.
11 Delete the Selected Oscilloscope—Permanently closes the current Oscilloscope window.

7.2.2.2 Export Oscilloscope Signals

Each oscilloscope window allows the user to export the signal data contained within them. The user is provided a number file formats to export to:

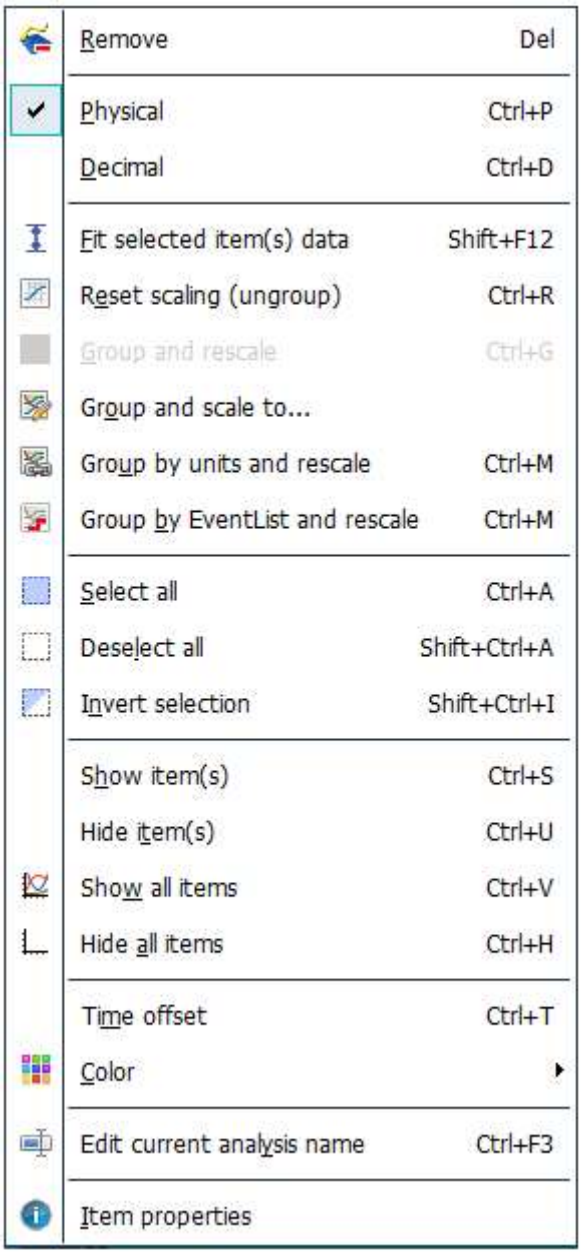
- Vector MDF (.DAT)
- MATLAB 5.0 (.MAT)
- MATLAB 5.0 Structured single or double precision (.MAT)
- MATLAB 5.0 Structure Extended (.MAT)
- Comma Separated Variables (.CSV)
- nCode S3 time series files (.S3T)
- National Instruments TDM files (.TDM)
- National Instruments TDM streaming files (.TDMS)

Once the required file format and location to save the file have been selected, the user is provided the option to select various options:



7.2.2.3 Oscilloscope Signals Management

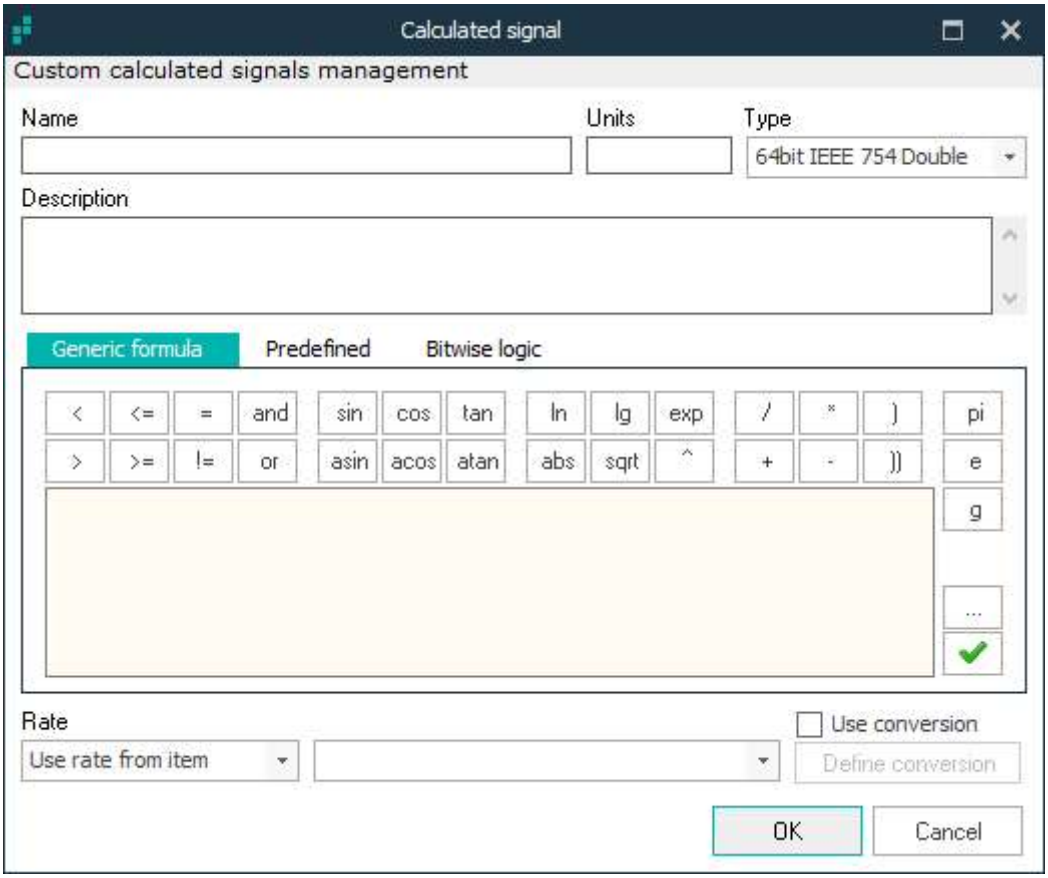
Items in the Scope can be Managed, e.g. removed, grouped, selected, hidden. The functions to do this are available by right clicking on the Items.



There is also a tool bar to perform commonly used tasks:

7.2.2.4 Defining Calculated Channels

fx Allows the user to define calculated channels. Opens a dedicated window as shown below.



7.2.2.5 Oscilloscope Settings

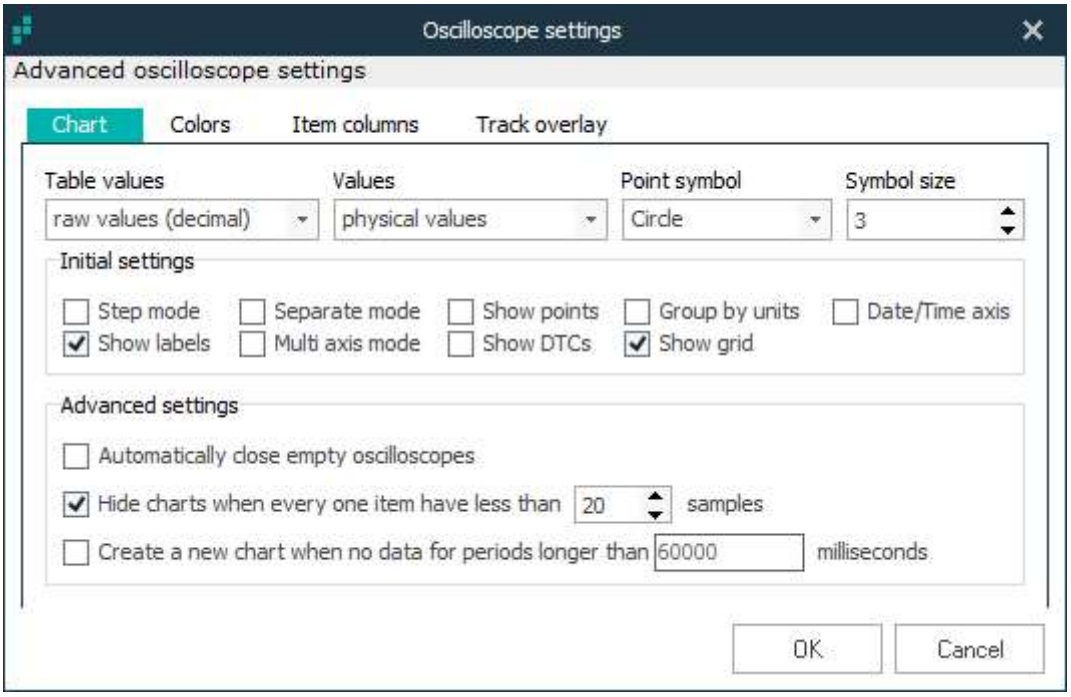


Chart tab

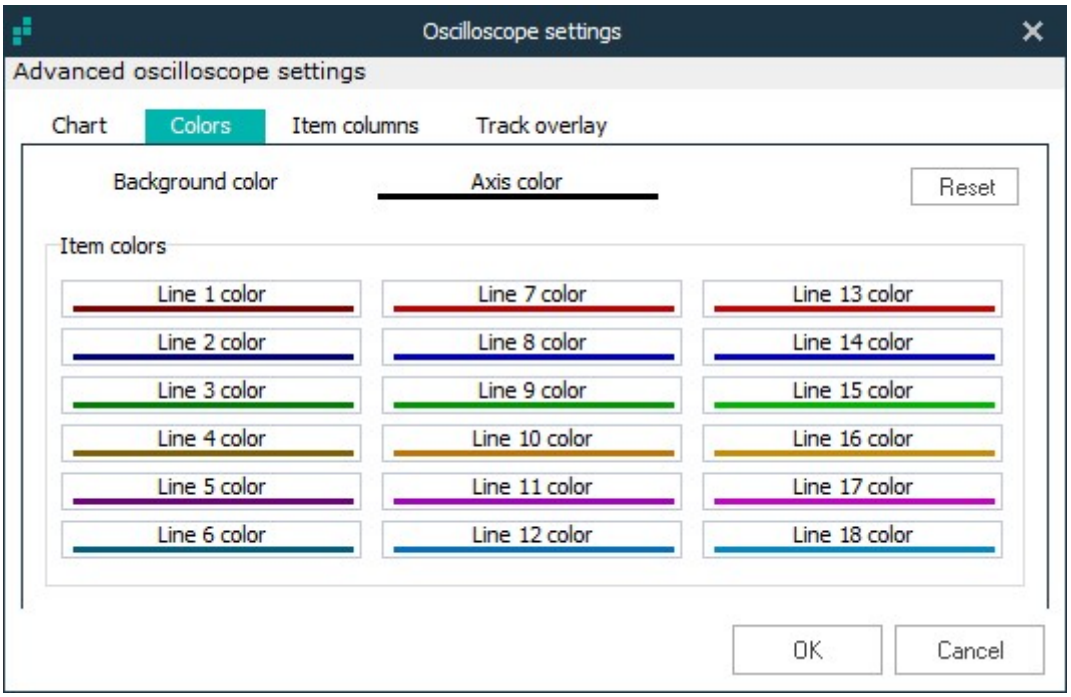
- Values—Drop down menu selects the value type to be plotted.
- Point Symbol—Drop down menu selects data point style.
- Symbol Size—Specifies the plotting size of a data point symbol.

Initial Settings:

- Allows the user to select the initial settings for an Oscilloscope on opening.

Advanced Settings:

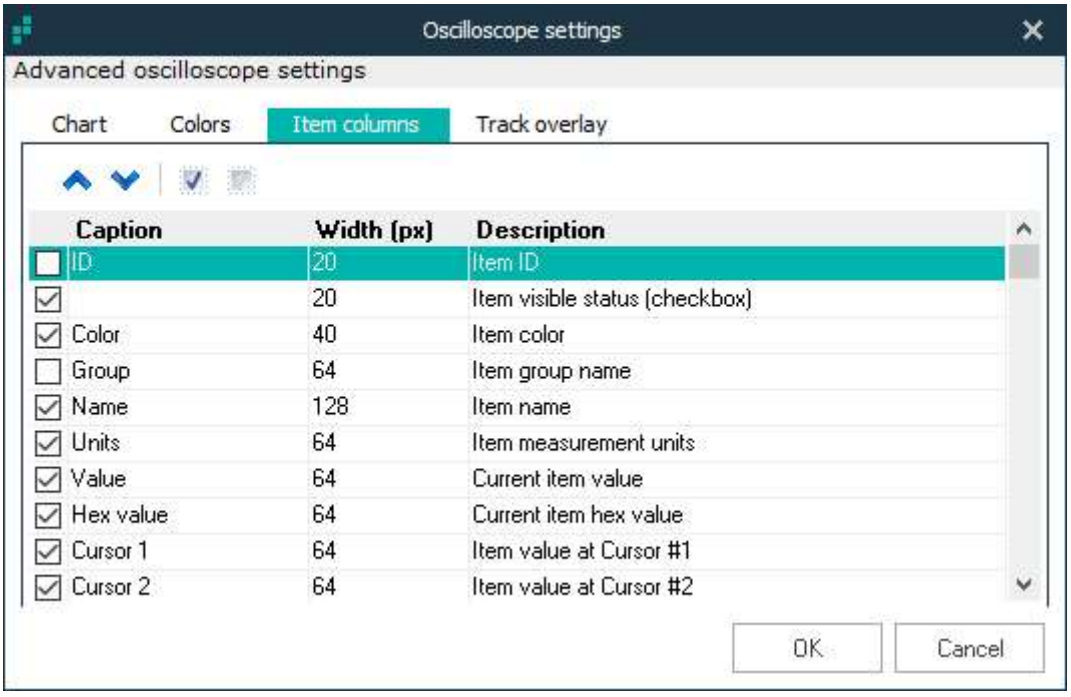
- Automatically close empty oscilloscopes—Automatically close any Oscilloscope windows not containing 'Data Items'.
- Hide charts when every one item have less than ( ) samples—Chose to hide data plots for items with minimal data points.
- Create new tab on gap longer than ( ) milliseconds—Separates data with greater than specified gap for display in oscilloscope.
- Create new tab on gap longer then ( ) milliseconds—Separates data with greater than specified gap for display in oscilloscope.
- Hide charts when every one item have less than ( ) samples—Allows the user to select display any items charts with minimal data points.



Colours tab

- Background Colour—Selects the backing colour for the graph section of the Oscilloscope.
- Item Colours—Allows the selection of the Oscilloscope plotting colour for each item listed in the 'Information' panel.

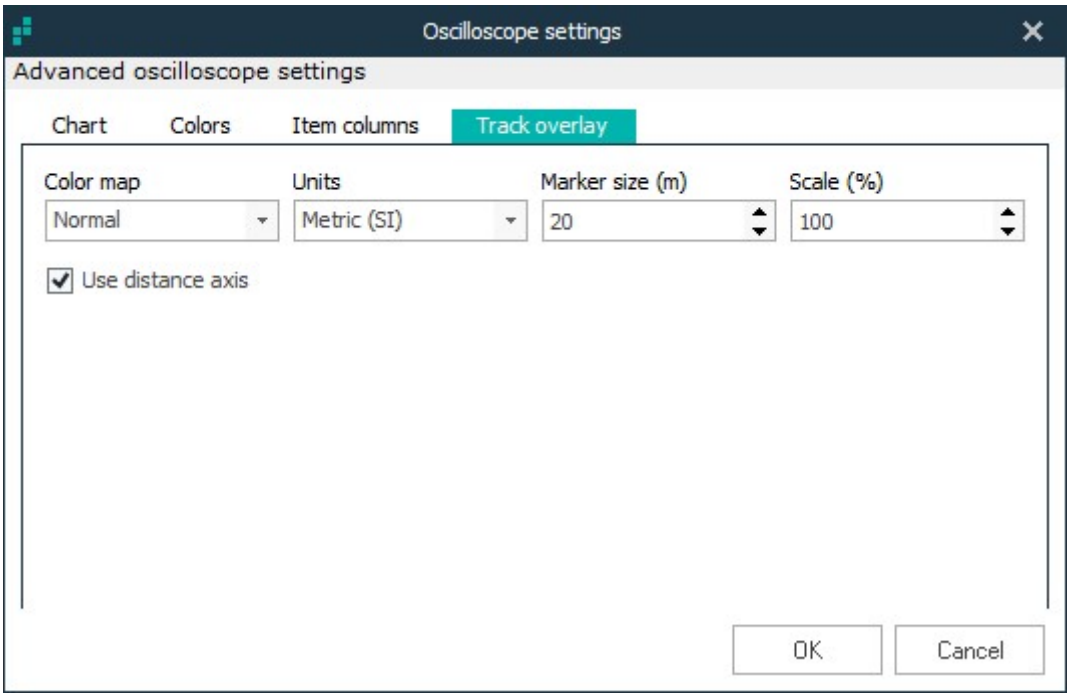
The tab also contains a 'Reset' button to return the settings back to default.



Item Columns tab

- Allows the user to select the information columns to be displayed for the items listed in the 'Information' panel using the satellite boxes.

The order the columns will be displayed in can also be altered using the 'Up/Down Arrow' toolbar icons.

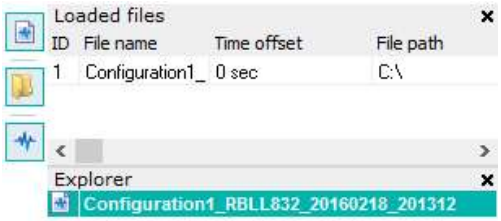


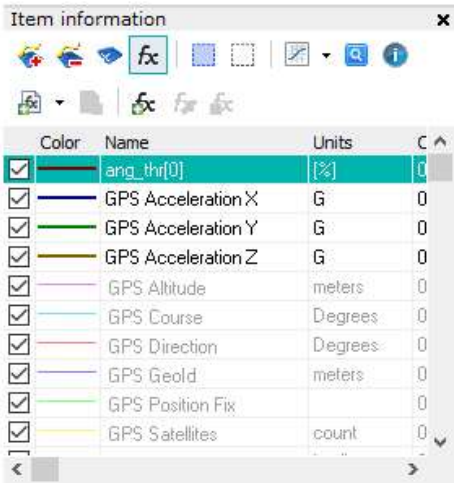
Track Overlay tab

- Allows the user to adjust the appearance of the Track displayed when GPS data is being interpreted.

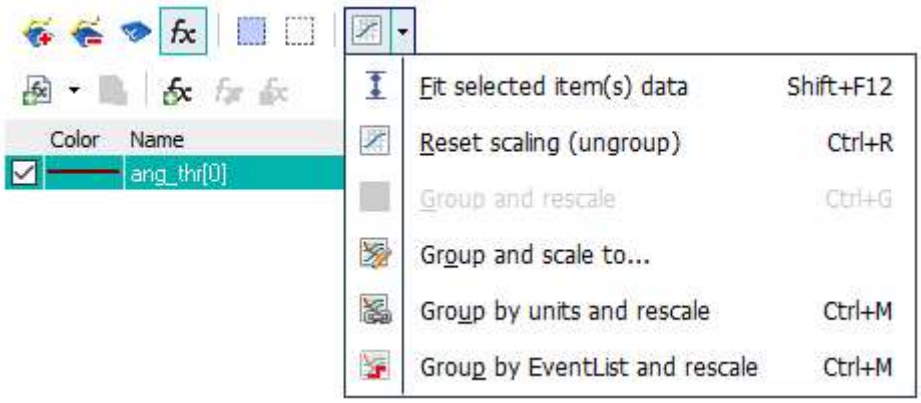
7.2.2.6 Information Panel

The 'Information' panel displays all the 'Data Items' currently added to the Oscilloscope or all the .IVD data files the 'Data Items' have been taken from depending on the tab selected, as shown below. The Buttons on the Left allow 'Loaded Files' the 'Explorer' and the 'Items' to be shown or hidden as follows:





The 'Information' panel functionality is controlled by a dedicated toolbar considered below.

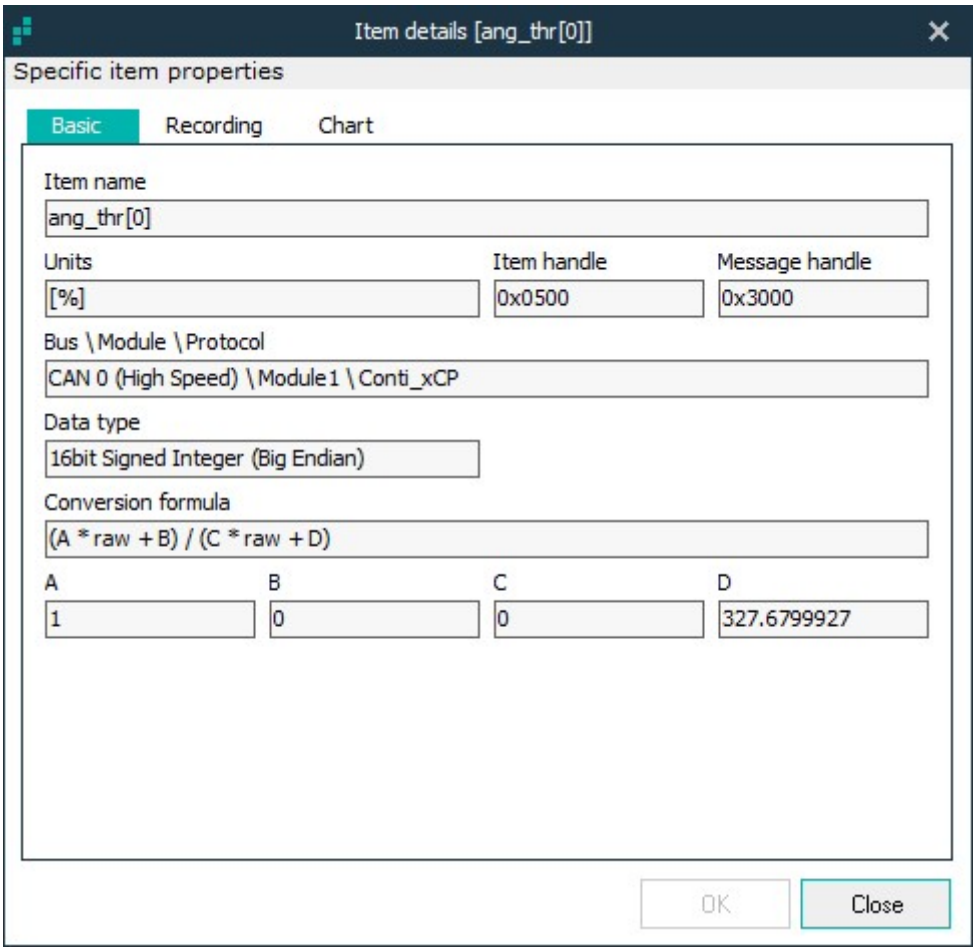


Important Functions include:

- Reset Scaling of Selected Item(s) - Removes any scaling operations applied to the selected items.
- Rescale Group of Selected Items Synchronising Axes—Automatically scales the selected items to allow display simultaneously on a single set of axes.
- Custom Scale Group of Selected Items Synchronising Axes—Allows the user to select the scaling to a single axis.
- Group Items by Units and Rescale Each Group Synchronising the Axes—Automatically scales the selected items to a single axis for each unit type.
- Select All Items—Selects all items.
- Deselect All Items—Deselects all items.
- Show Detailed Item Properties—Opens the dedicated window considered below.

Item Details

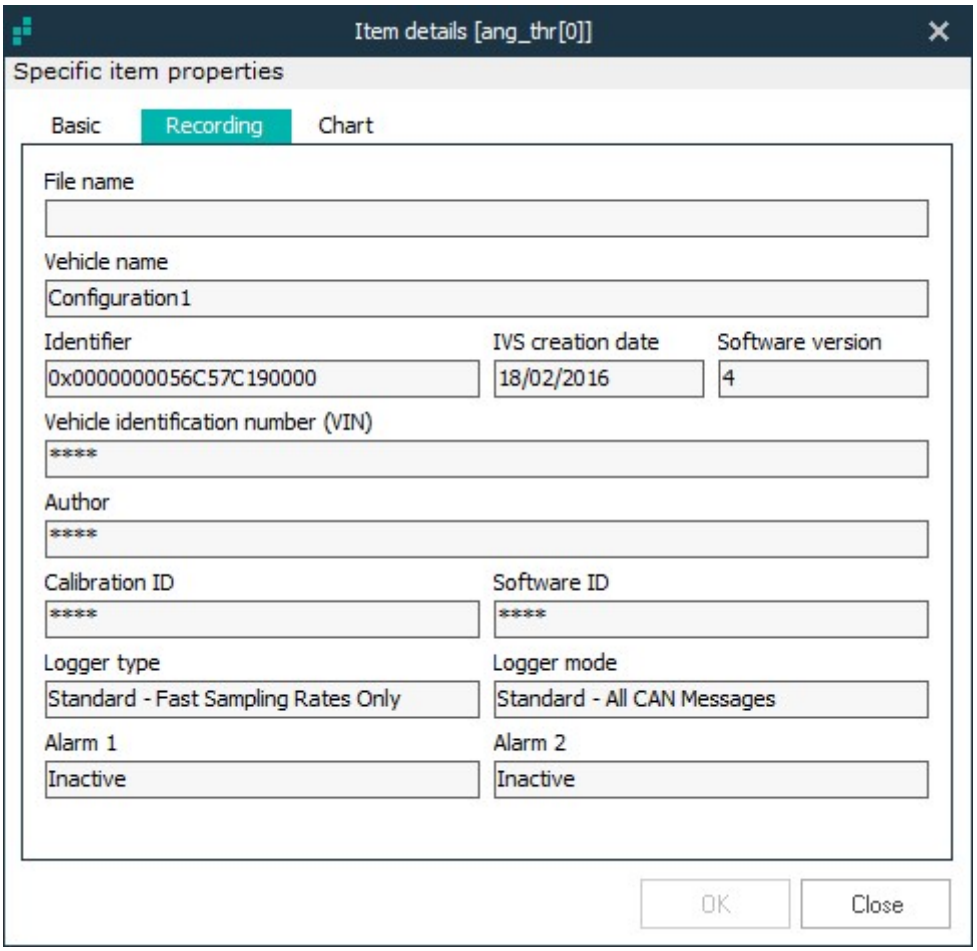
Basic Tab



- Item Name—Displays the Item name.
- Units—Displays the designated units for this item.
- Sampling Method—Displays the sampling method used.
- Sampling Rate—Displays the rate at which the item was sampled by the Rebel data logger.
- PID—Displays the Hexadecimal identifier for the ‘Data Items'.
- Mode—Designates the diagnostic service to record data.
- Low Range Bound—Specifies minimum value.
- High Range Bound—Specifies maximum value.
- Item Handle—Internal program use.
- Message Handle—Internal program use.
- Conversion Formula—Displays any conversion formula applied.
- A—Display coefficient A in the formula.
- B—Display coefficient B in the formula.
- C—Display coefficient C in the formula.
- D—Display coefficient D in the formula.

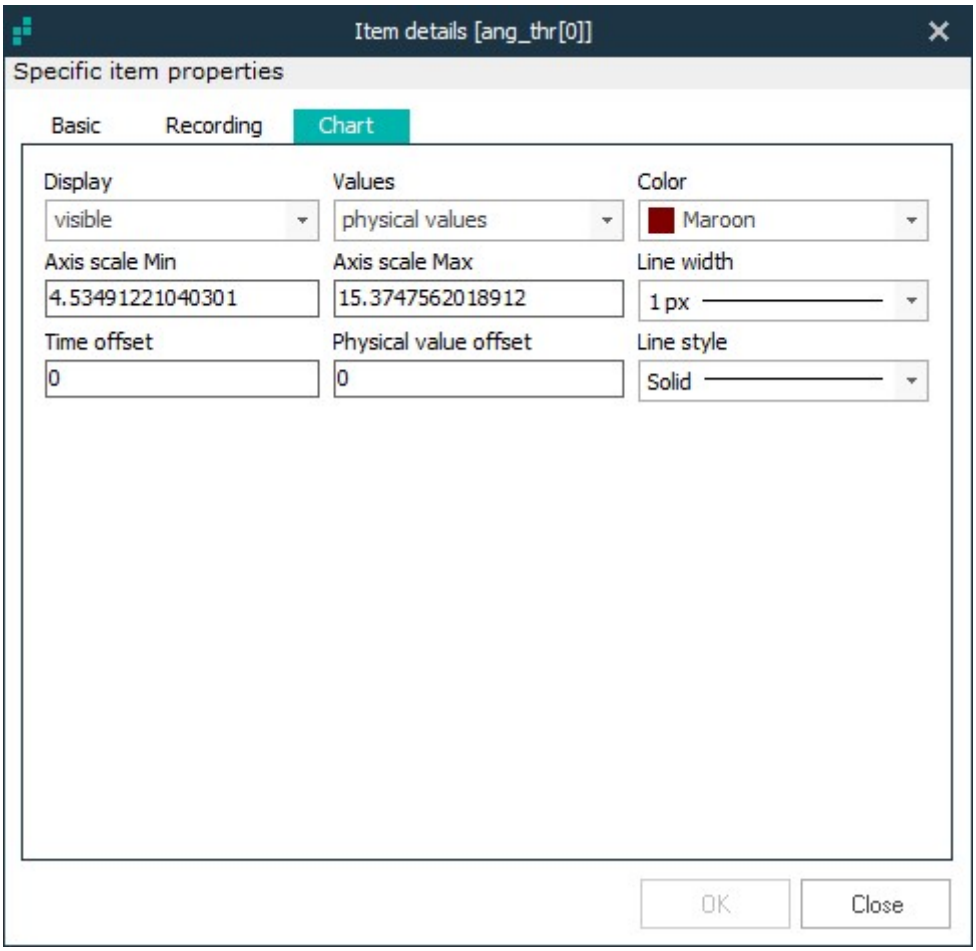
Item Details

Recording Tab



- File Name—Displays the .IVD data file the item was imported from.
- Vehicle Name—Displays the 'Configuration Structure' the item was data logged using.
- Identifier—Internal program use.
- IVS Creation Date— Displays the 'Configuration Structure' creation date.
- Software Version—IVD file version for backward compatibility.
- Vehicle Identification Number—Displays the Vehicle Identification Number, if entered.
- Author—Displays the author of the 'Configuration Structure', if entered.
- Calibration ID—Displays the calibration identity, if entered.
- Software ID—Displays the software identity, if entered.
- Logger Type—Displays the sampling mode selected.
- Logger Mode—Displays the logger operational mode if selected.
- Alarm 1—Displays the date for Alarm 1.
- Alarm 2—Displays the date for Alarm 2.

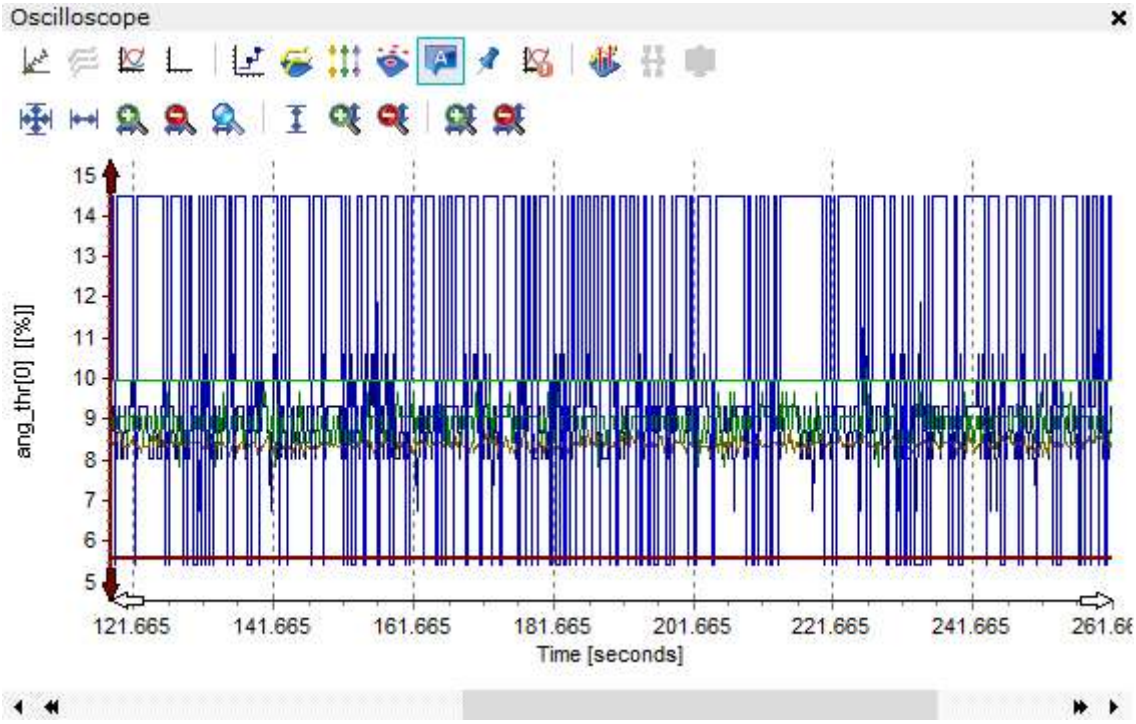
Chart Tab



- Display—Drop down menu selects the display status of the chart for this data item.
- Values—Drop down menu selects the data type to plot.
- Colour—Drop down menu selects the plotting colour for this item.
- Axis Scale Min—Designates the minimum value of the y axis.
- Axis Scale Max—Designates the maximum value of the y axis.
- Line Width—Drop down menu selects the plotting line width.
- Time Offset—Specifies a time offset for the x axis if required.
- Physical Value Offset—Specifies an offset automatically applied the data values.
- Line Style—Drop down menu selects the plotting style for the item line.

7.2.2.7—Oscilloscope Panel

The ‘Oscilloscope’ panel displays the plots for all the ‘Data Items’ currently added to the Oscilloscope, an example plot can be seen below.

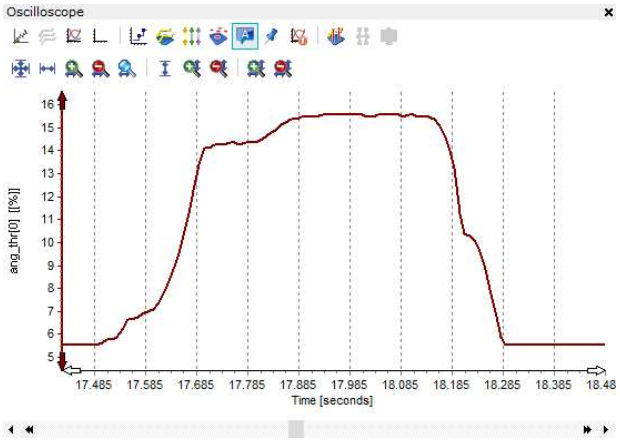


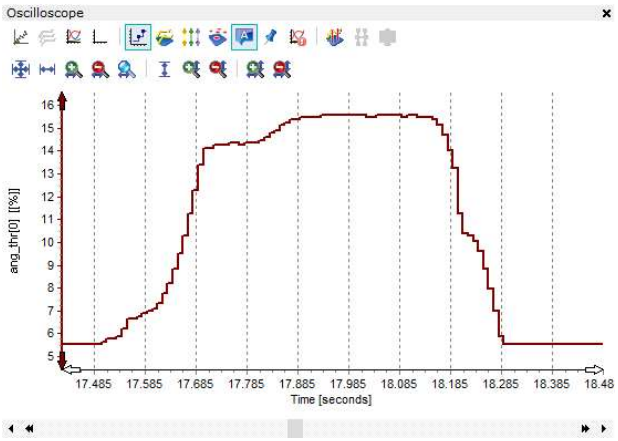
The ‘Oscilloscope’ functionality is controlled by a dedicated toolbar which is considered below. Each feature is then considered individually.

1 XY Scatter Plot
2 Show each Lap data per item
3 Show all Items
4 Hide all Items
5 Show steps between data points
6 Separate Items on Oscilloscope
7 Axis display modes
8 Show item points
9 Show point labels
10 Show Trigger Events on Oscilloscope
11 Show Diagnostic Trouble Codes on Oscilloscope
12 Show Cursors
13 Lock Cursor time difference
14 Locate Data in Oscilloscope from Item Data Panel

Show the steps between Data Items

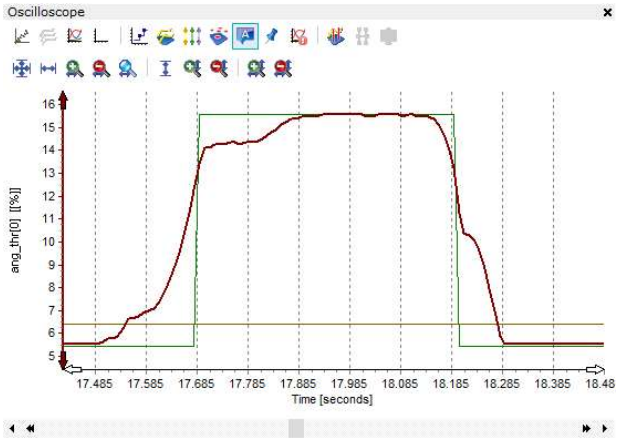
In the normal plotting mode, the oscilloscope tool automatically interpolates between points to draw a continuous trace through the data points. This mode allows the user to select to display the step in value between each recorded data point. An example of each display mode can be seen below.

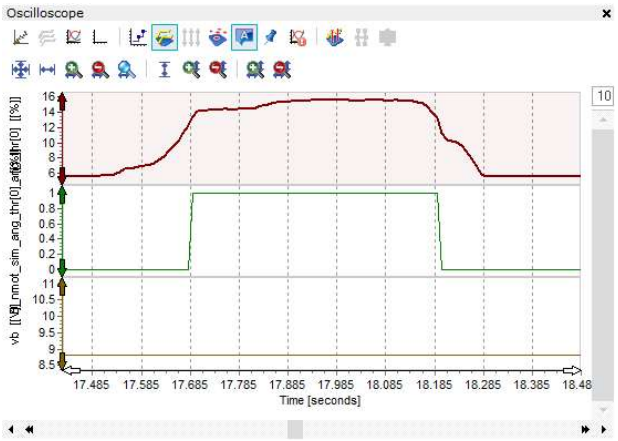




Separate Items on Oscilloscope

The default mode for the oscilloscope displays the plots for all the data items overlaid, displaying the axis for the currently selected ‘Data Item’. The ‘Separate’ function allows the user to display each ‘Data Item’ on an individual set of axis, an example can be seen below.

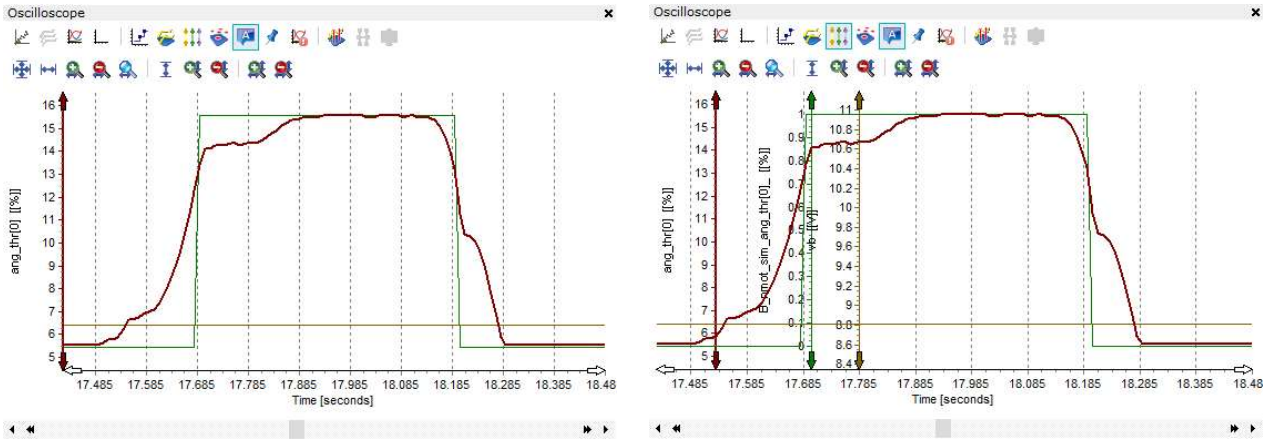




With the plots separated the user can scroll through the plots user the cursor on the right of the panel. The number of plots displayed at once can be selected by clicking the number at the top of the scroll bar.

Axis display modes

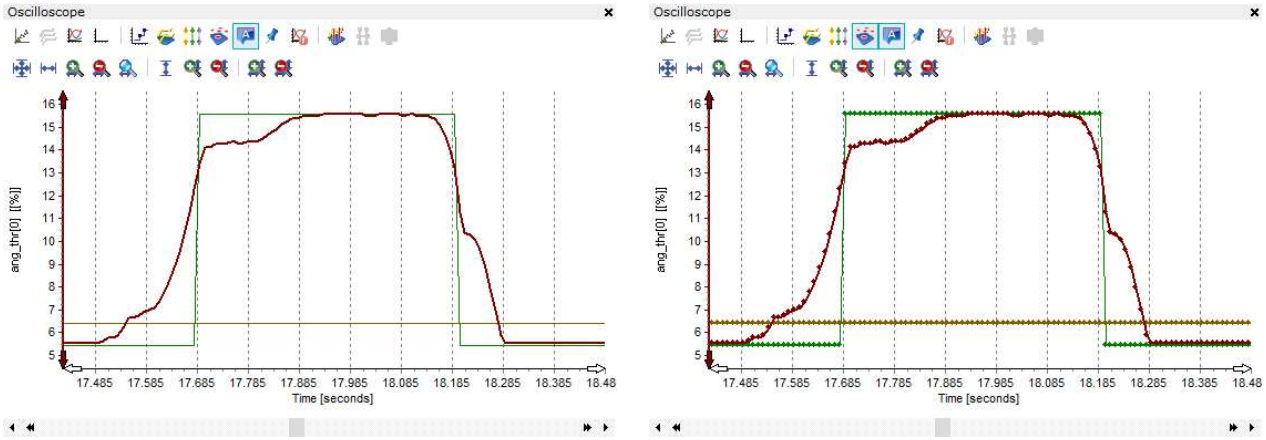
In default mode, the oscilloscope displays a single axis for the currently selected ‘Data Item’, this mode allows an axis for each data item to be displayed simultaneously as can be seen below.



With the multiple axes displayed, they can be moved independently by the user. The selected axis also highlights the corresponding plot.

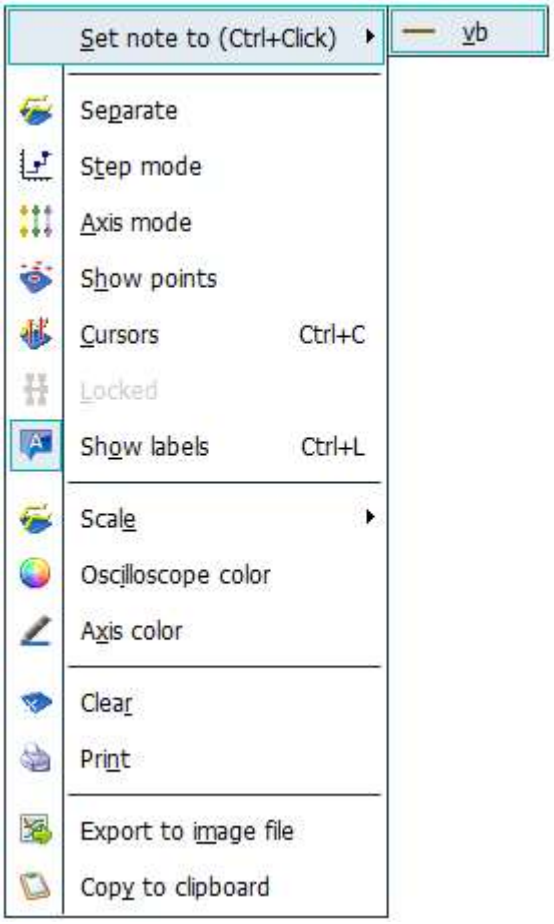
Show item points

This feature allows the user to select to display all the recorded data points for the currently plotted ‘Data Items’ as can be seen below.

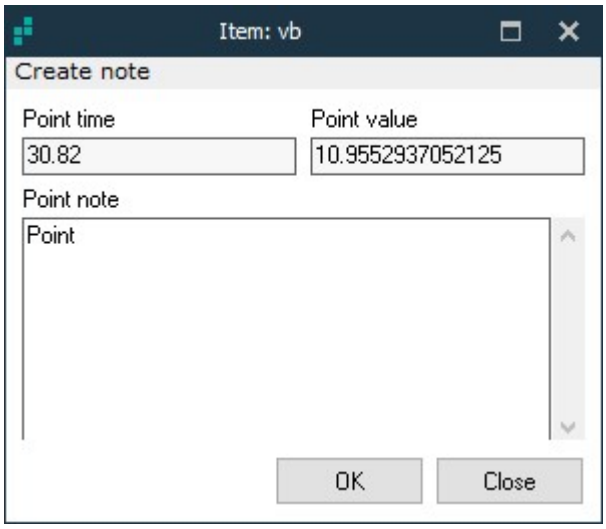


Show point labels

The oscilloscope contains a feature which allows the user to label particular data points of interest. A label is added to a data point using the 'right click' menu shown below.



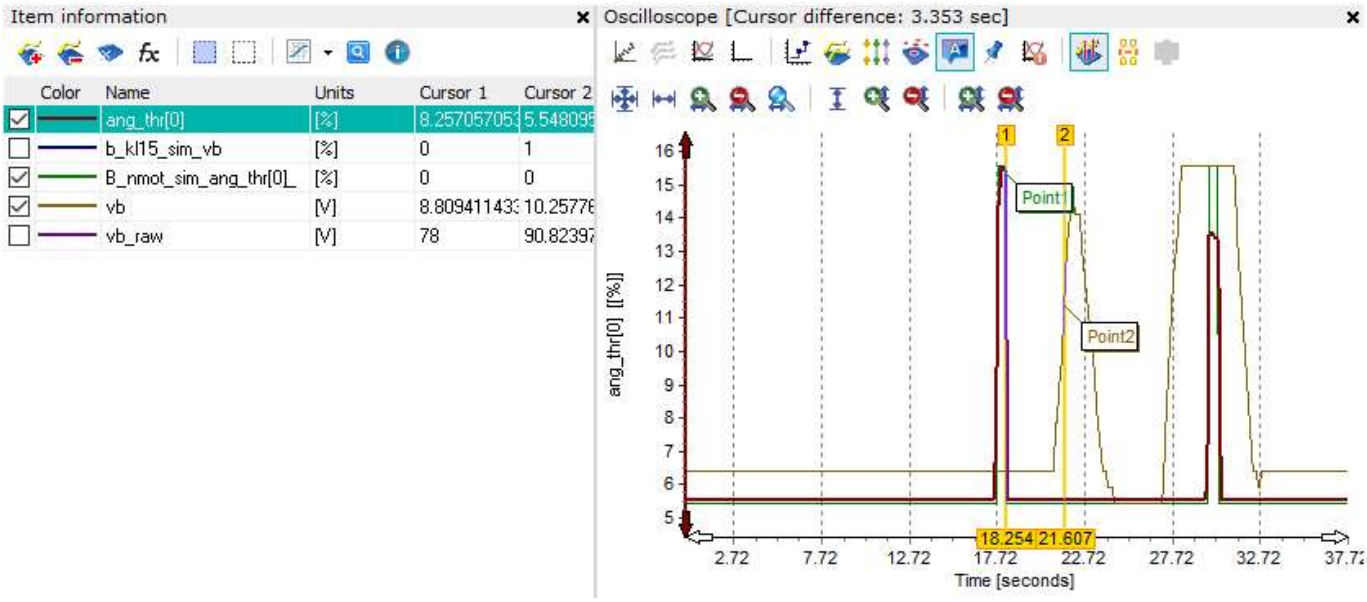
The 'right click' menu item opens a window which allows the user to enter a note for the data item as shown below.



The feature then allows the user to display all the point labels for the plotted 'Data Items' as shown below.

Show cursors

The Oscilloscope features double cursors, which allow the user to measure time differences, but also display the value for each ‘Data Item’ at the cursor location time as can be seen below.



Lock cursor time difference

The tool also features the ability to lock the cursors at a set time difference, only allowing both to move simultaneously.

7.2.3—Item Data

The ‘Item Data’ section of the Oscilloscope allows the user to display all the data points collected for the selected ‘Data Item’ in the ‘Item Information’ panel. The ‘Item Data’ panel is accessed using the ‘Item Data’ tab as shown below.

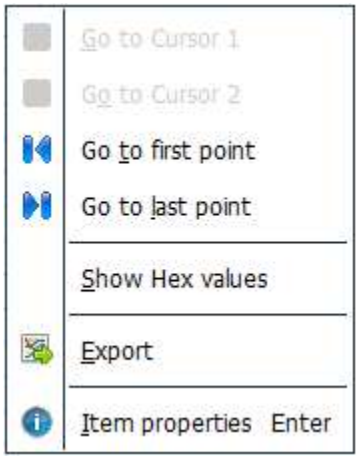
Item data

ang_thr[0] | b_kl15_sim_vb | B_nmot_sim_ang_thr[0]_ | vb_raw

ID	Time(sec)	Raw	Physical	CAN message
0	0	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
1	0.01	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
2	0.02	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
3	0.03	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
4	0.04	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
5	0.05	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
6	0.06	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
7	0.07	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
8	0.08	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
9	0.09	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
10	0.1	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
11	0.11	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
12	0.12	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
13	0.13	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
14	0.14	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
15	0.15	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
16	0.16	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
17	0.17	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
18	0.18	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00
19	0.19	1818	5.54809582672455	40 **1A 07** 07 4E 00 00 00

The panel opens displaying the recorded values for the ‘Data Item’ currently selected in the ‘Item Information’ panel. Additional ‘Data Items’ can be added by clicking on them in the ‘Item Information’ panel. With more than one ‘Data Item’ present in the oscilloscope window, the ‘Item data’ panel creates a tab for each ‘Data Item’ as can be seen above. It is also possible to have both the ‘Oscilloscope’ and ‘Item Data’ panels displayed simultaneously by selecting both tabs.

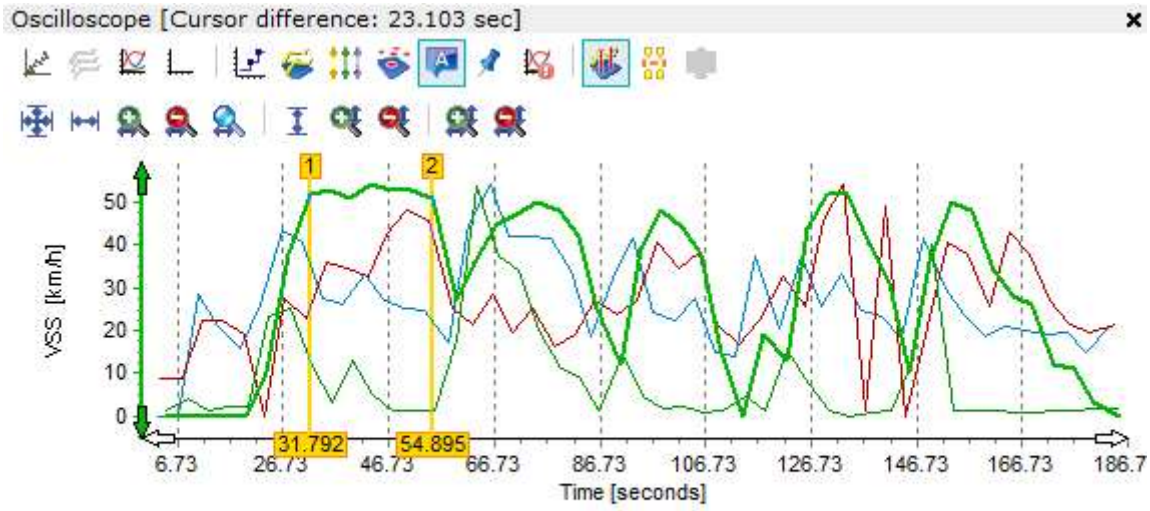
The ‘Item Data’ panel also contains a ‘right click’ menu as shown below.

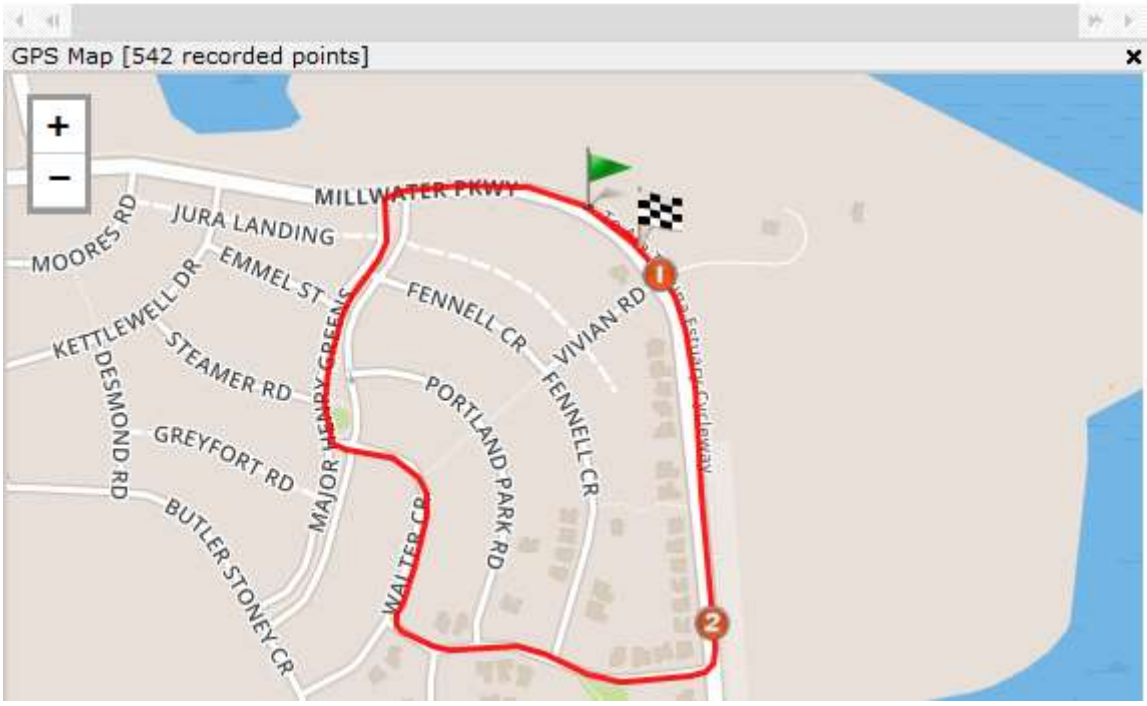


- Export— Allows the item data to be exported to .txt file.
- Item Properties— Re-opens the ‘Basic’ and ‘Recording’ tabs of the ‘Properties’ window.

7.2.4—Route Navigator

The ‘Route Navigator’ tab of the ‘Oscilloscope’ window allows the user to display the route taken by the vehicle during data logging. The tool uses the GPS data, if recorded, to plot the position of the vehicle during data logging and superimposes the results over a map, to display the navigated route. As such this feature is only available for .IVD files which were recorded using ’Configuration Structures’ containing the ‘GPS Bus’. The ‘Route Navigator’ panel is accessed using the ‘Route Navigator’ tab and is shown below.

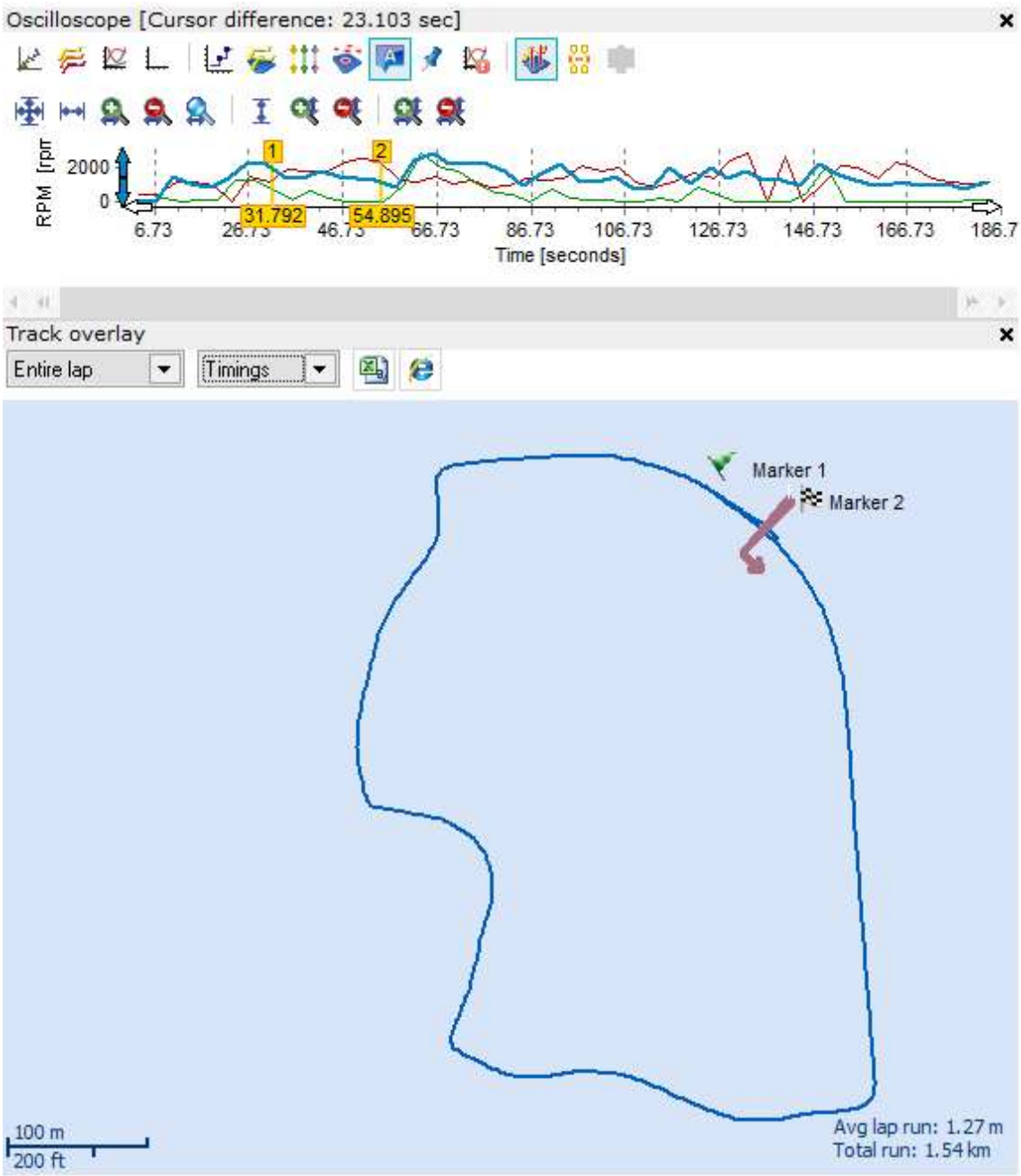




The Route Navigator tab is intended as a visual display of the GPS location data. The Rebel records much more than this including acceleration, altitude and course.

7.2.5—Track Overlay

The ‘Track Overlay’ tab of the ‘Oscilloscope’ window allows the user to display Lap Timing for the vehicle during data logging. The tool uses the GPS data, if recorded, to plot the position of the vehicle during data logging display the navigated Track. As such this feature is only available for .IVD files which were recorded using ‘Configuration Structures’ containing the ‘GPS Bus’. The ‘Track Overlay’ panel is accessed using the ‘Track Overlay’ tab and is shown below.



7.2.6—Statistics

The ‘Statistics’ tab of the ‘Oscilloscope’ window allows the user to display a summary of all the data contained in the window. The summary contains data details and also some key statistics for the data such as root-mean-square and standard deviation. The ‘Item Statistic Data’ panel is accessed using the ‘Statistic’ tab and is shown below.

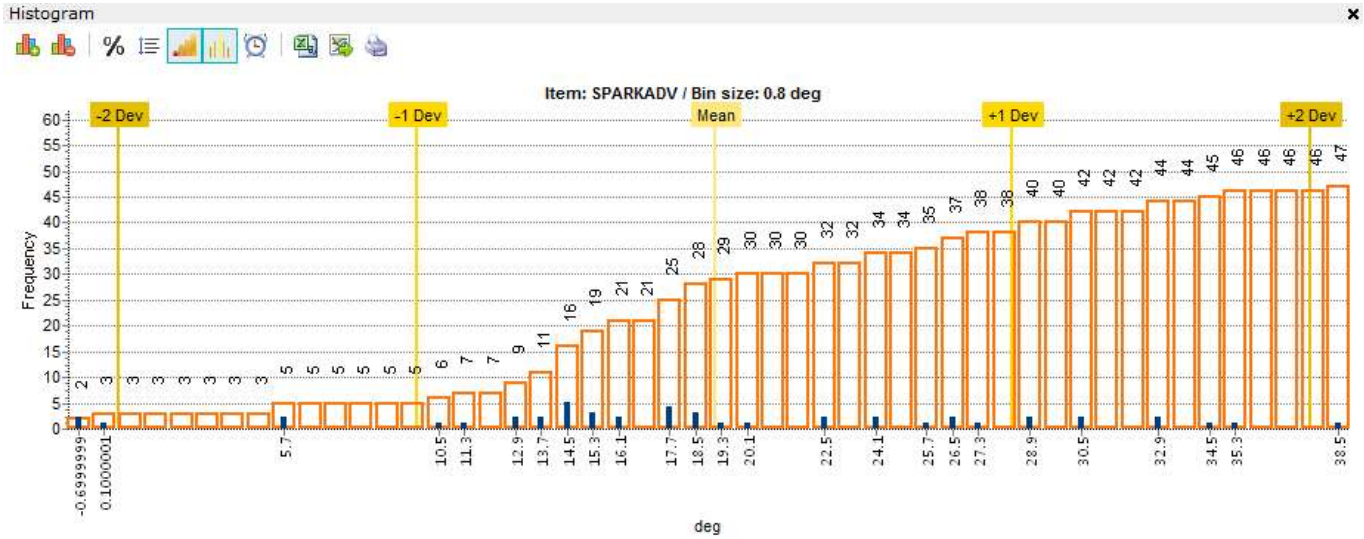
Item statistic data

Bus	Module	Protocol	Name	Units	Samples	Start [sec]	End [sec]	Duration [sec]	Lowest value	Highest value	Ave
CAN 0 (High Speed)	Module1	Keyword2000	FUELSYS2		3	57.707	183.328	125.621	0.000000	0.000000	0.00
GPS Bus	Module1	GPSProtocol	GPS Acceleration X	G	1776	0.000	185.715	185.715	-0.976638	0.124941	-0.3
GPS Bus	Module1	GPSProtocol	GPS Acceleration Y	G	1776	0.000	185.715	185.715	-0.343816	0.828077	0.03
GPS Bus	Module1	GPSProtocol	GPS Acceleration Z	G	1776	0.000	185.715	185.715	-1.695277	-0.203067	-0.9
GPS Bus	Module1	GPSProtocol	GPS Altitude	meters	542	1.543	186.393	184.850	25.100000	61.100000	35.5
GPS Bus	Module1	GPSProtocol	GPS Course	Degrees	542	1.543	186.393	184.850	0.250000	358.800000	186.
GPS Bus	Module1	GPSProtocol	GPS Direction	Degrees	0	N/A	N/A	N/A	N/A	N/A	N/A
GPS Bus	Module1	GPSProtocol	GPS GeoId	meters	542	1.543	186.393	184.850	27.100000	27.200000	27.1
GPS Bus	Module1	GPSProtocol	GPS Position Fix		542	1.543	186.393	184.850	1.000000	2.000000	1.34
GPS Bus	Module1	GPSProtocol	GPS Satellites	count	542	1.543	186.393	184.850	8.000000	12.000000	11.8
GPS Bus	Module1	GPSProtocol	GPS Speed	km/h	542	1.543	186.393	184.850	0.000000	55.763720	29.9
GPS Bus	Module1	GPSProtocol	GPS Temperature	Degrees	542	1.543	186.393	184.850	0.000000	0.000000	0.00
CAN 0 (High Speed)	Module1	Keyword2000	IAT	deg	48	2.219	186.730	184.511	30.000000	38.000000	32.2
CAN 0 (High Speed)	Module1	Keyword2000	LOAD_ABS	%	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	LOAD_PCT	%	47	3.242	184.008	180.766	0.000000	86.676200	35.1
CAN 0 (High Speed)	Module1	Keyword2000	LONGFT1	%	16	6.641	182.640	175.999	-7.025300	0.787700	-3.1
CAN 0 (High Speed)	Module1	Keyword2000	LONGFT2	%	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	LONGFT3	%	16	6.641	182.640	175.999	99.231500	99.231500	99.2
CAN 0 (High Speed)	Module1	Keyword2000	LONGFT4	%	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	MAF	g/s	47	3.921	184.689	180.768	0.420000	37.650000	11.3
CAN 0 (High Speed)	Module1	Keyword2000	MAP	kPa	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	MIL_DIST	km	6	26.046	182.986	156.940	0.000000	0.000000	0.00
CAN 0 (High Speed)	Module1	Keyword2000	MIL_TIME	min	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	O2S11	V	48	1.200	185.712	184.512	0.000000	0.835000	0.40
CAN 0 (High Speed)	Module1	Keyword2000	O2S12	V	48	1.543	186.055	184.512	0.000000	0.875000	0.49
CAN 0 (High Speed)	Module1	Keyword2000	O2S13	V	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	O2S21	V	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	O2S22	V	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	PTO_STAT	-	0	N/A	N/A	N/A	N/A	N/A	N/A
CAN 0 (High Speed)	Module1	Keyword2000	RPM	rpm	47	2.905	183.671	180.766	0.000000	2890.500000	143
CAN 0 (High Speed)	Module1	Keyword2000	SHRTFT1	%	48	1.881	186.393	184.512	-6.244000	6.256800	-1.2
CAN 0 (High Speed)	Module1	Keyword2000	SHRTFT11	%	48	1.200	185.712	184.512	-7.025300	3.912900	-1.5

The window contains a toolbar which allows the user to export the summary to .CSV, Excel or HTML format. The data items displayed can also be selected depending on whether the data item has logged data recorded in the IVD. This allows the user to display only data items with recorded data or to display only the data items with no recorded data.

7.2.7—Histogram

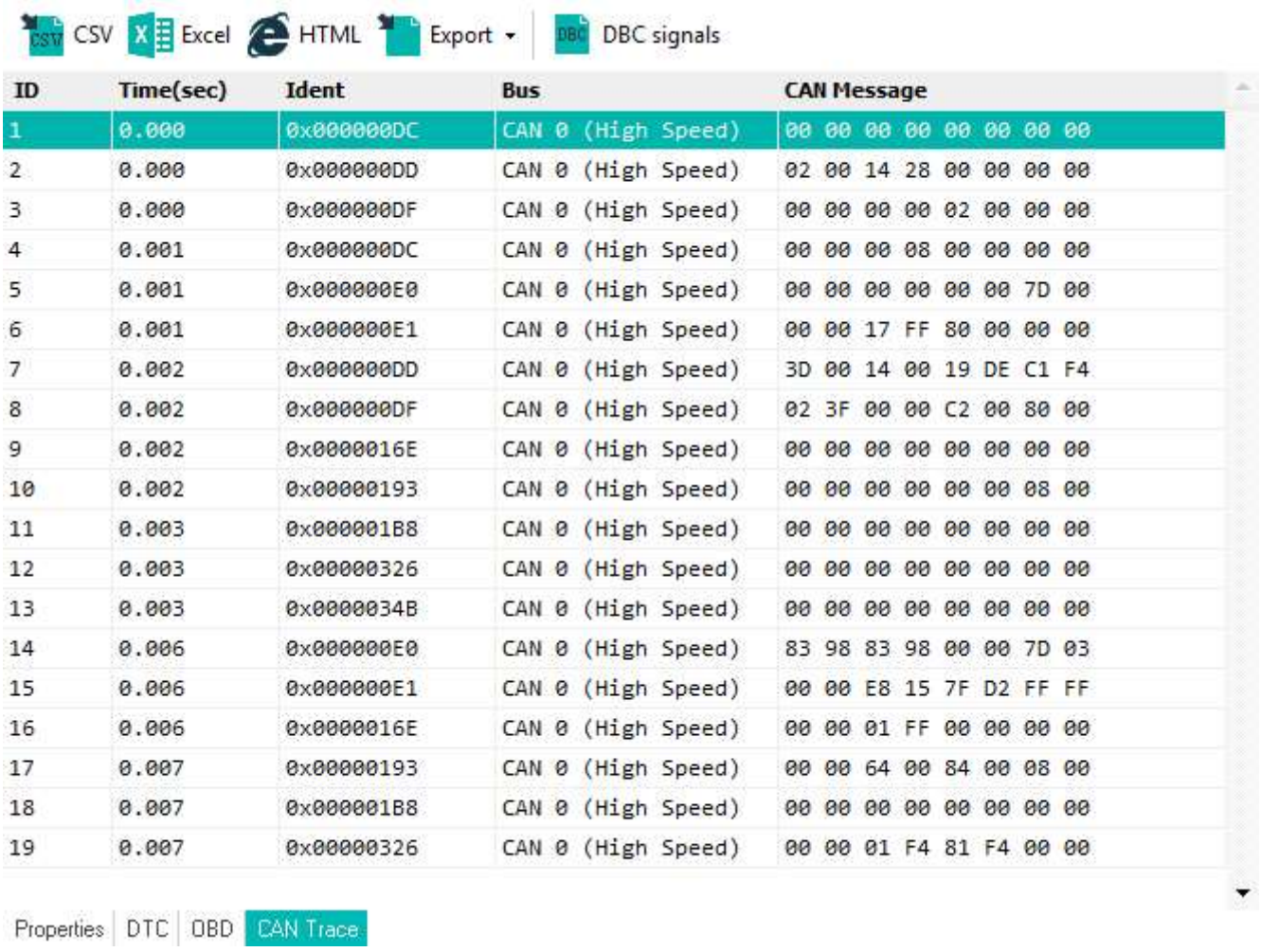
The ‘Histogram’ tab of the ‘Oscilloscope’ window allows the user to display a Histogram of data items contained in the window, this tab and is shown below.



7.3—Raw CAN Data Retrieval

DiaLog contains the ability within the CAN Monitor protocol to run in a 'listen only' mode which records all the transmitted raw CAN data directly to the SD card.

The raw CAN data can be reviewed once the data file has been imported into the 'Analysis' tab of DiaLog as shown below. Raw CAN data can only be retrieved from data files where the 'Log all' feature was used.



In the 'Main' panel there are a number of tabs located at the bottom. The fourth tab opens the 'Broadcast CAN' as shown above. The panel will only populated if the structure was set to 'Log all' on the 'CAN monitor' protocol.

The 'Broadcast CAN' display tab has a limit of 1,000,000 message lines per displayed trace. Any recorded traces longer than this will be automatically cropped. The user is informed by the prompt shown below.

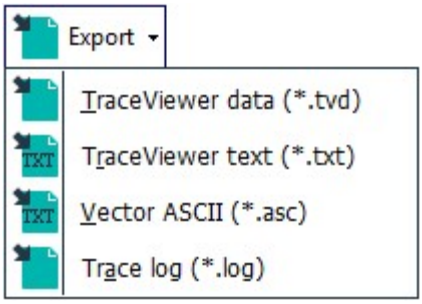
To view the complete trace, it must be exported from DiaLog. This can be performed using one of the toolbar icons at the top of the tab. When exporting raw CAN data the complete recorded messages trace is always exported regardless of any cropping in DiaLog display.

The panel is controlled by the toolbar along the top which allows the CAN trace to be printed or saved to a number of different formats.

Allows the user to export the complete CAN trace to CSV file format.

Allows the user to export the complete CAN trace to Excel file format.

Allows the user to export the complete CAN trace to HTML file format.



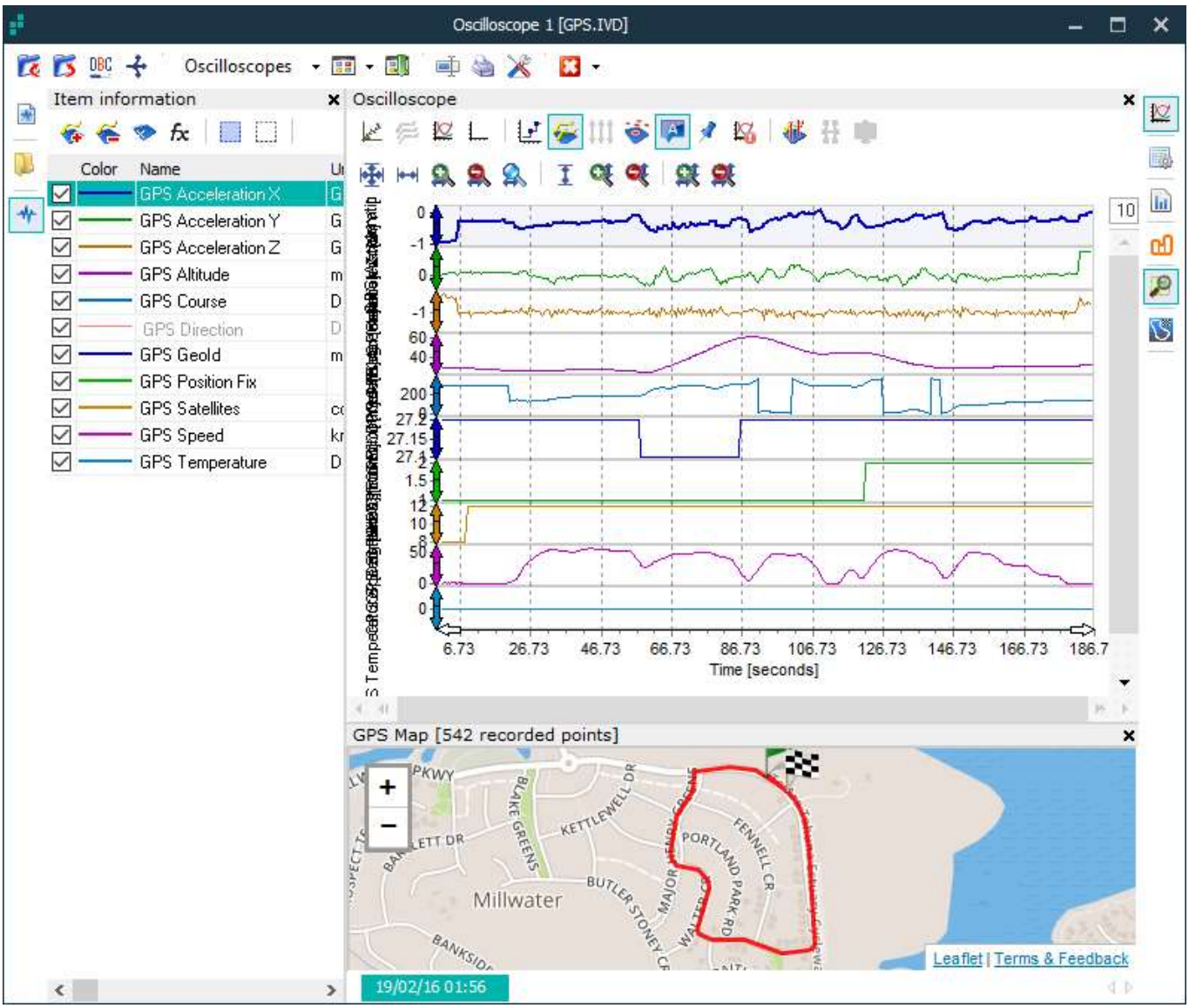
Allows the user to export the complete CAN trace to a number of common file formats:

- TVD—Module Analyser Trace Viewer file format.
- TXT—Module Analyser Trace Viewer text file format.
- Vector ASCII
- Trace log

7.4—GPS Data

The Rebel can be configured to record a whole range of GPS data, this includes the location, altitude and course of the vehicle while logging. The GPS data is stored within the IVD data file.

The data recorded can be viewed in the oscilloscope using the data item manager, as shown below.

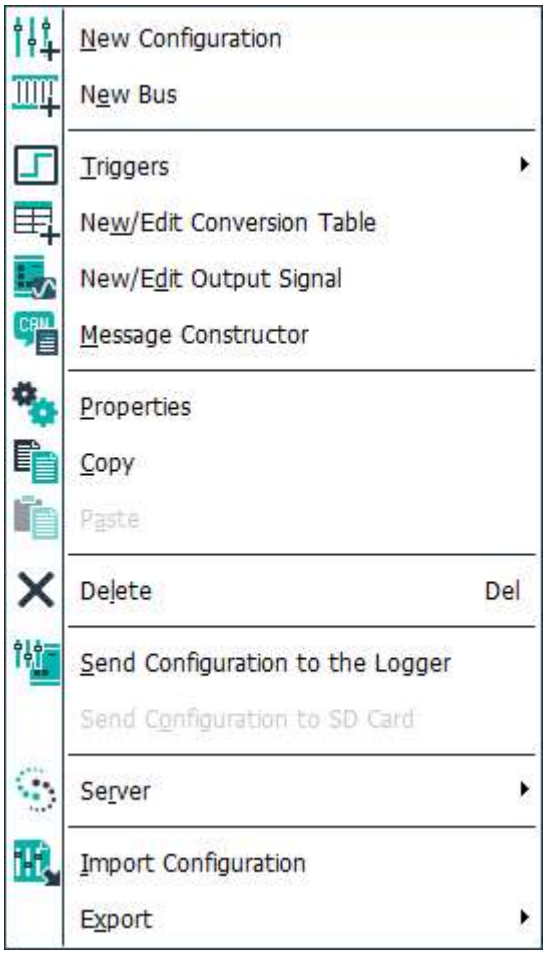


- GPS Acceleration—Records three axis acceleration data.
- GPS Altitude—Records the altitude above sea level of the logger in metres.
- GPS Course—Records the measured heading of direction of travel.
- GPS Direction—Compass indicated direction.
- GPS Geoid—Difference in metres of current altitude to Earth Geoid surface.
- GPS Position Fix—Indication of successfully determined position.
- GPS Satellites—Records the number of satellites the Rebel has locked on to at any time.
- GPS Speed—Records the GPS determined speed of the logger.
- GPS Temperature— A built in temperature sensor records the ambient temperature (If supported by your hardware).

8—Advanced Features

8.1—Introduction

This section outlines some of the more advanced features found within DiaLog. They allow the user to create complex and detailed 'Configuration Structures' to suit more comprehensive data logging tasks. The capabilities are accessed using the right click menu that appears when you right click on the Configuration, it is shown below.



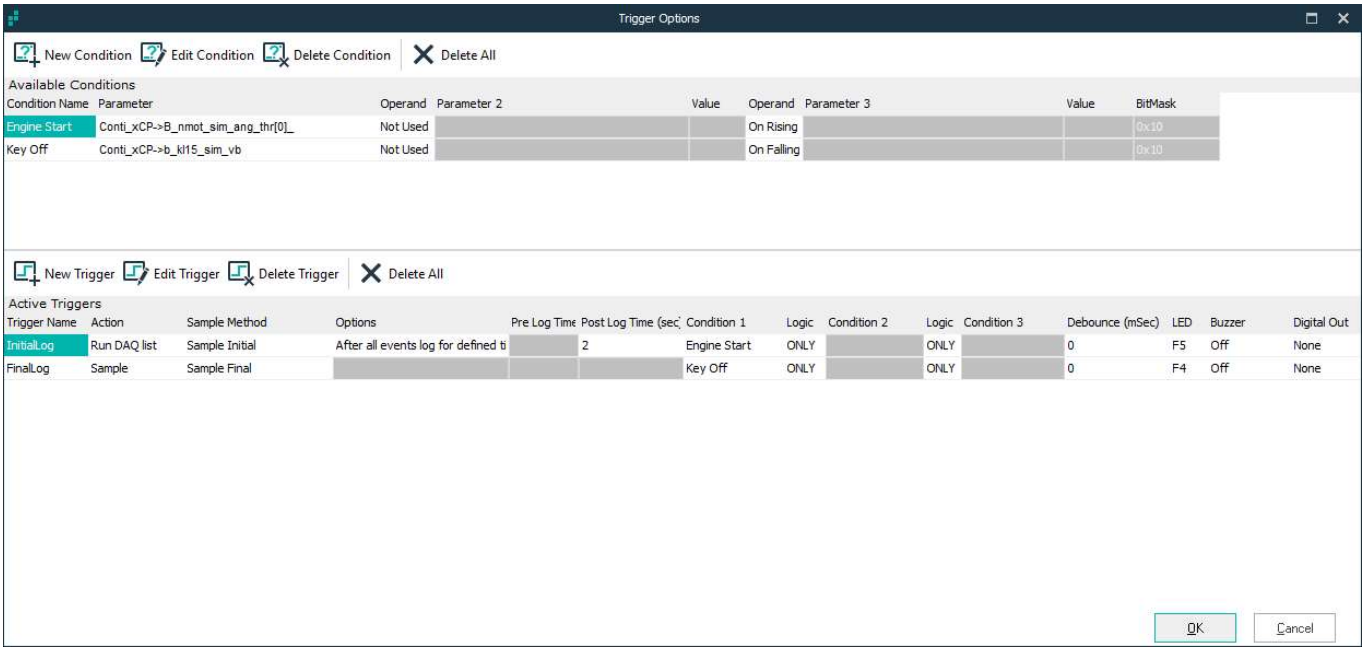
The Following items are the Advanced features:

- New/Edit Triggers
- New/Edit Conversion Table
- New/Edit Output Signal
- Message Constructor

8.2—Triggers

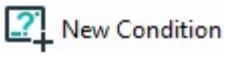
The ‘Trigger’ facility within DiaLog allows the user to create conditions, which upon being met, a number of programmable actions can be assigned. To create a new ‘Trigger’ use the ‘Local Projects’ panel ‘right click’ menu.

The ‘Trigger Options’ window is shown below.

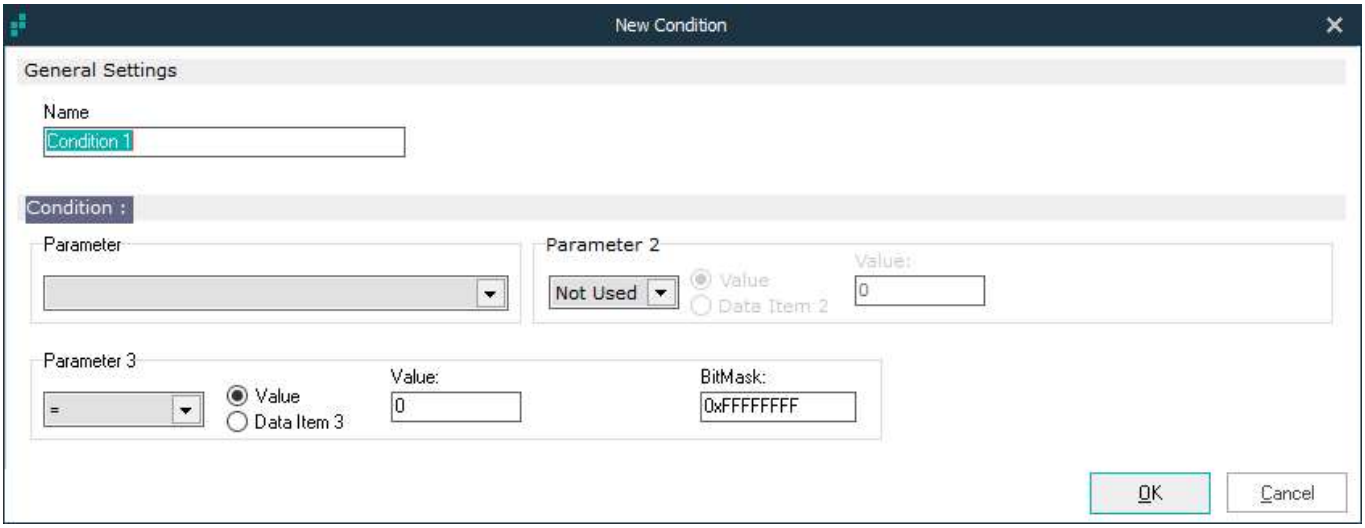


Creating Trigger Conditions

To create a new ‘Trigger’ there must first be at least one ‘Condition’ for the ‘Trigger’ to depend on. Once the required ‘Conditions’ have been created the ‘Trigger’ can be set. The ‘Available Conditions’ panel is controlled by the toolbar at the top of the panel.



Allows the user to create a new condition based on any ‘Data Item’ in the current ‘Configuration Structure’. Opens the window shown below.



General Settings:

- Name—Assigns the name for the condition.

Condition:

- Parameter—Drop down menu selects a ‘Data Item’ the condition depends on.

- Parameter 2—Allows the user to add or subtract an additional ‘Data Item’ or value.

- Parameter 3—Specifies the condition with an operand and dependant on either a ‘Data Item’ or a value.
- BitMask—This allows the user to specify a particular section of a ‘Data Item’ message to be filtered by the condition. Set the required bits to 1 and the rest to 0.

The completed ‘Condition’ is summarised as it is built in the ‘Condition’ bar.

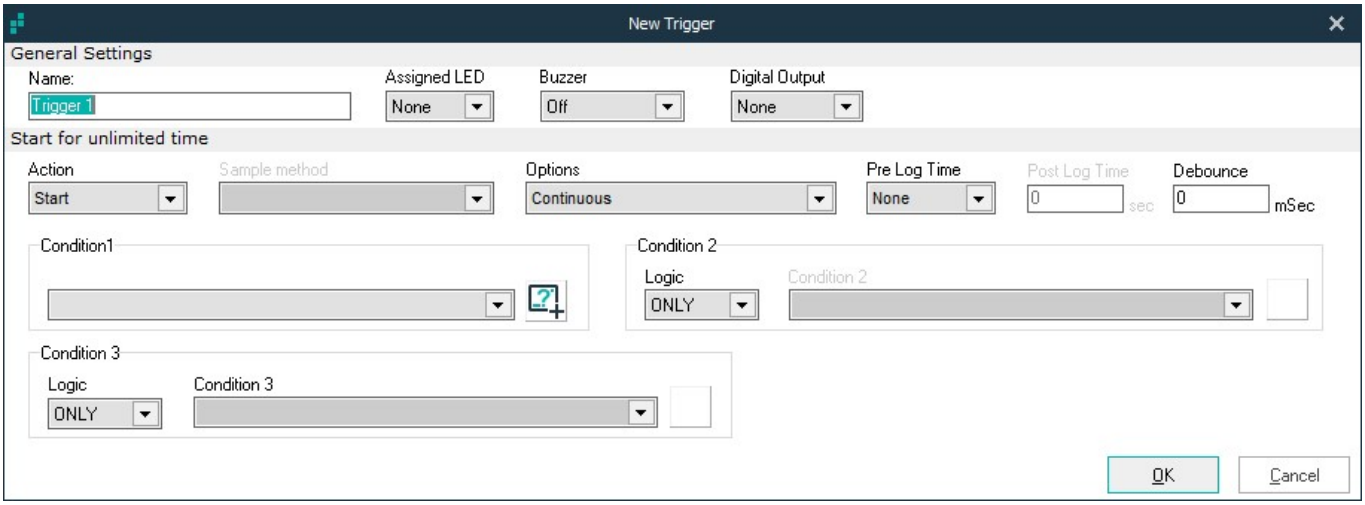
Edit Condition—Re-opens the ‘Condition’ window above for the selected ‘Condition’ to allow the user to adjust the settings. ‘Condition’ settings can also be edited directly in the ‘Trigger’ window.

Delete Condition—Removes the selected ‘Conditions’ from the ‘Trigger Options’ window.

Creating a Trigger

Once a minimum of one ‘Condition’ has been created, a ‘Trigger’ can be set to act upon this ‘Condition’ being satisfied. A ‘Trigger’ can be created to depend on up to two ‘Conditions’ and associated logic.

Allows the user to create a new ‘Trigger’ for the current ‘Configuration Structure’. Opens the window shown below.



General Settings:

- Name—Assigns the name for the trigger.
- Assigned LED—Assigns a function LED on the Rebel to indicate trigger activation

Trigger summary:

- Action—Drop down menu selects the action the trigger will perform.
- Sample Method—If a sampling action is chosen, selects the type.
- Options—Selects the action period.
- Pre Log Time—Specifies the pre trigger logging time.
- Post Log Time—Specifies the post trigger logging time.
- Debounce—Allows the user to specify a minimum time the condition must be satisfied before the trigger is set.
- Condition 1—Drop down menu selects the first condition for the trigger.
- Condition 2—Drop down menu selects whether it is only condition 1 dependant or applies logic with a Condition 2.
- Condition 3—Drop down menu selects whether it is only dependant on two conditions or applies logic with a Condition 3 or logic to the two previous conditions.

Each option for a trigger is summarised below:

Action:

- Stop—Stops all current data logging action.
- Start—Starts logging the complete current configuration.
- Stop and sample—Stops all current data logging action and performs the chosen sampling.

- Start and sample—Starts logging the complete current configuration and performs the chosen sampling.
- Run DAQ list—Runs the selected DAQ list to specified options.
- Fast sampling—Switches the current data logging to fast sample rate while trigger conditions are satisfied.
- Slow sampling—Switches the current data logging to slow sample rate while trigger conditions are satisfied.
- Sample—Performs the chosen sample method while the trigger conditions are satisfied.

Sample method:

- Mark event—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'. Records the time of trigger event in IVD for later review in oscilloscope.
- Reinitialise triggers—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'.
- Read emissions related DTCs—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'. Retrieves and stores all supported EOBD/OBD diagnostic trouble codes. (Modes 0x3, 0x07 and 0x0A.)
- Read advanced DTCs—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'. Retrieves and stored all advanced diagnostic trouble codes. (Mode 0x18 or 0x19 depending on protocol)
- Read OBD—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'. Performs and stored a complete EOBD/OBDII report of all supported services.
- Read Monitored Status—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'.
- Sample Event List—An option for 'Start and Sample', 'Stop and Sample', 'Sample' and 'Run DAQ list'. For 'Stop and Sample' and 'Sample' it performs the sampling as configured in the 'Event List'. (See Section for creating an 'Event List'.) For 'Start and Sample' and 'Run DAQ list' the 'Event list' is also sampled according to the subsequent chosen options.
- Custom X—An option for 'Start and Sample', 'Stop and Sample' and 'Sample'. This options activates a pre-defined group of user messages to be sent to the vehicle. The message groups are created using the 'Message Constructor' tool

Options:

- Continuous—Selects to log the selected 'Sample Method' continuously.
- After all events log for defined time—Selects to log the 'Sample Method' during the period defined by the 'Post Log Time' after the occurrence of the last event.
- After first event log for defined time—Selects to log the 'Sample Method' during the period defined by the 'Post Log Time' after the first occurrence of the trigger event.
- Whilst conditions are satisfied—Selects to log the 'Sample Method' only while the trigger conditions are satisfied.

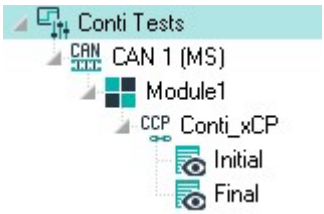
For 'Triggers' selected to sample or run an 'Event List', this list must be created separately within the 'Configuration Structure' in order to be sampled. The process for creating an 'Event list' is covered in the section below.

Edit Trigger—Re-opens the 'Trigger' window to allow the user to edit the settings for the selected 'Trigger'. 'Trigger' settings can also be edited directly in the 'Trigger' window.

Delete Trigger—Removes the selected 'Trigger' from the 'Trigger Options' window, but does not affect any 'Conditions'.

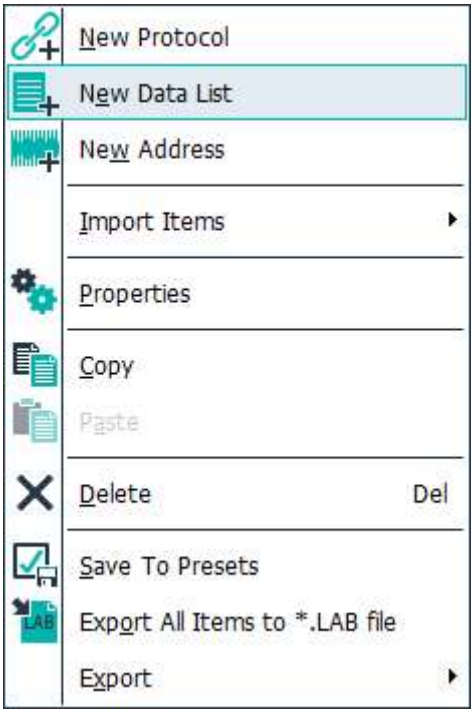
Delete All—Removes all 'Conditions' or 'Triggers' from the 'Trigger Options' window and as such the 'Configuration Structure'.

Once the required 'Triggers' have been created, clicking 'OK' will automatically close the window and apply the 'Trigger' settings to the 'Configuration Structure'. For a 'Configuration Structure' with 'Triggers' applied to it the 'Configuration' logo in the 'Local Projects' panel changes to display the presence of 'Triggers' as can be seen below.

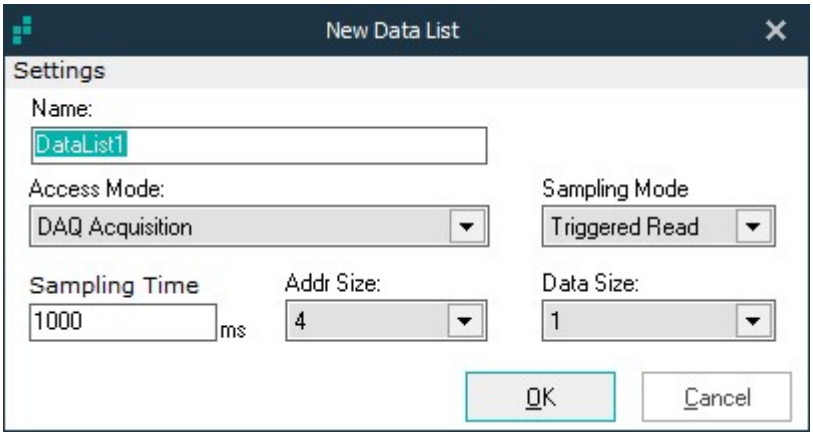


8.2.1—Creating an One-Shot List

A ‘One-Shot List’ can be chosen to be sampled within a ‘Trigger’. However, the ‘Data Items’ to be sampled/ran in the ‘One-Shot List’ must first be defined and the list created. This is performed within a ‘Configuration Structure’ using the ‘Protocol’ ‘right click’ menu shown below:

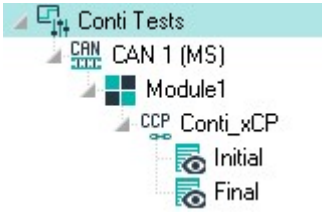


This opens a ‘New One-Shot List’ window shown below:



- Access Mode—Selects the method to be used to acquire the ‘Data Items’ to be added to the list. (Polling for Diagnostic protocols and DAQ for CCP/xCP.)
- Sampling Mode—Selects the how the list will be sampled.
- Sampling Time—Specifies the sampling period if relevant.
- Addr Size—Selects the address sizes used protocol to be used to sample the list.
- Data Size—Selects the data sizes for the protocol to be used to sample the list.

Once the chosen settings have been selected, clicking ‘OK’ creates a new ‘Event List’ in the ‘Configuration Structure’ under the selected ‘Module’ as shown below:



Once an ‘One-Shot List’ has been created it can be populated with the ‘Data Items’ to be sampled. This is performed in the same manner as adding ‘Data Items’ to any ‘Protocol’. ‘Data Items’ can be copied and pasted from within the ‘Local Projects’ or can be imported from industry standard files.

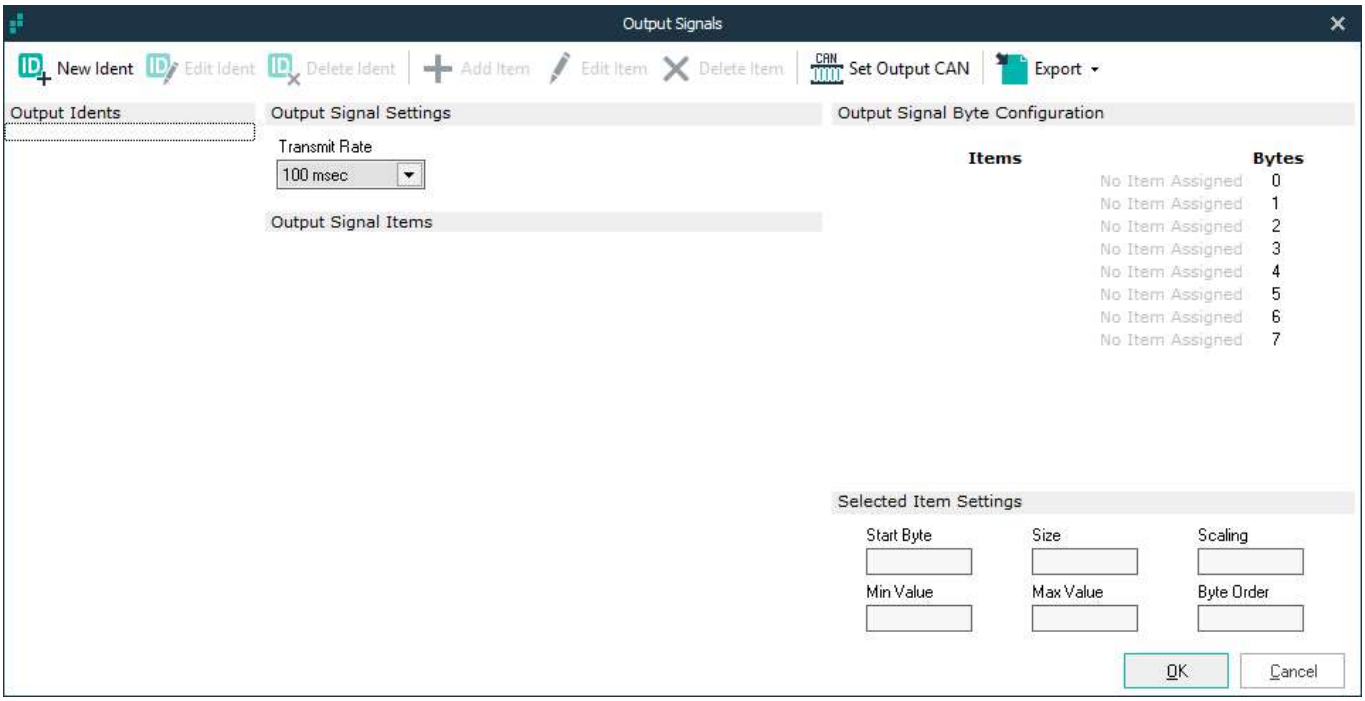
The transmission rate is set by the ‘One-Shot List’ settings. However, the user can select to stream item from a ‘One-Shot List’ to StreamLog.

Up to 120 items can be selected within a single ‘One-Shot List’ with up to 15 lists per structure.

8.3—Output Signals

DiaLog contains a feature which allows a user to program an ‘Output Signal’ in to a ‘Configuration Structure’ which configures the Rebel data logger to output a specific signal on a specified ‘Bus’. To create a new ‘Output Signal’ use the ‘Local Projects’ panel ‘right click’ menu.

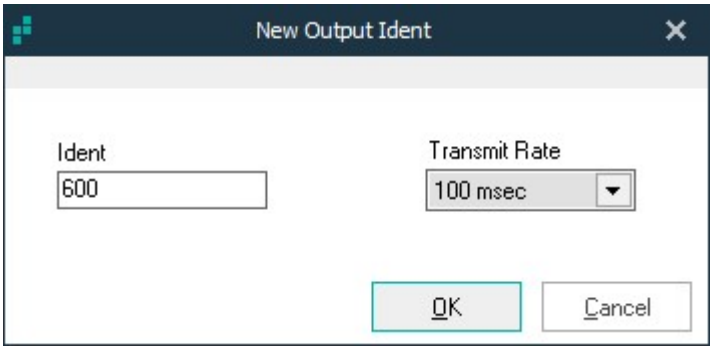
The ‘Output Signals’ window is shown below.



Creating an Output Identifier

An ‘Output Identifier’ designates the CAN message carrying the required data. Each ‘Output Identifier’ specifies lines of CAN message and as such can hold 7 bytes of data each.

Allows the user to specify a new ‘Output Identifier’ and the transmission rate. Opens the window shown below.



- Ident—Specifies the ‘Output Identifier’, automatically defaults to a suitable value.
- Transmit Rate—Designates the rate at which the data signal will be sent by the data logger.

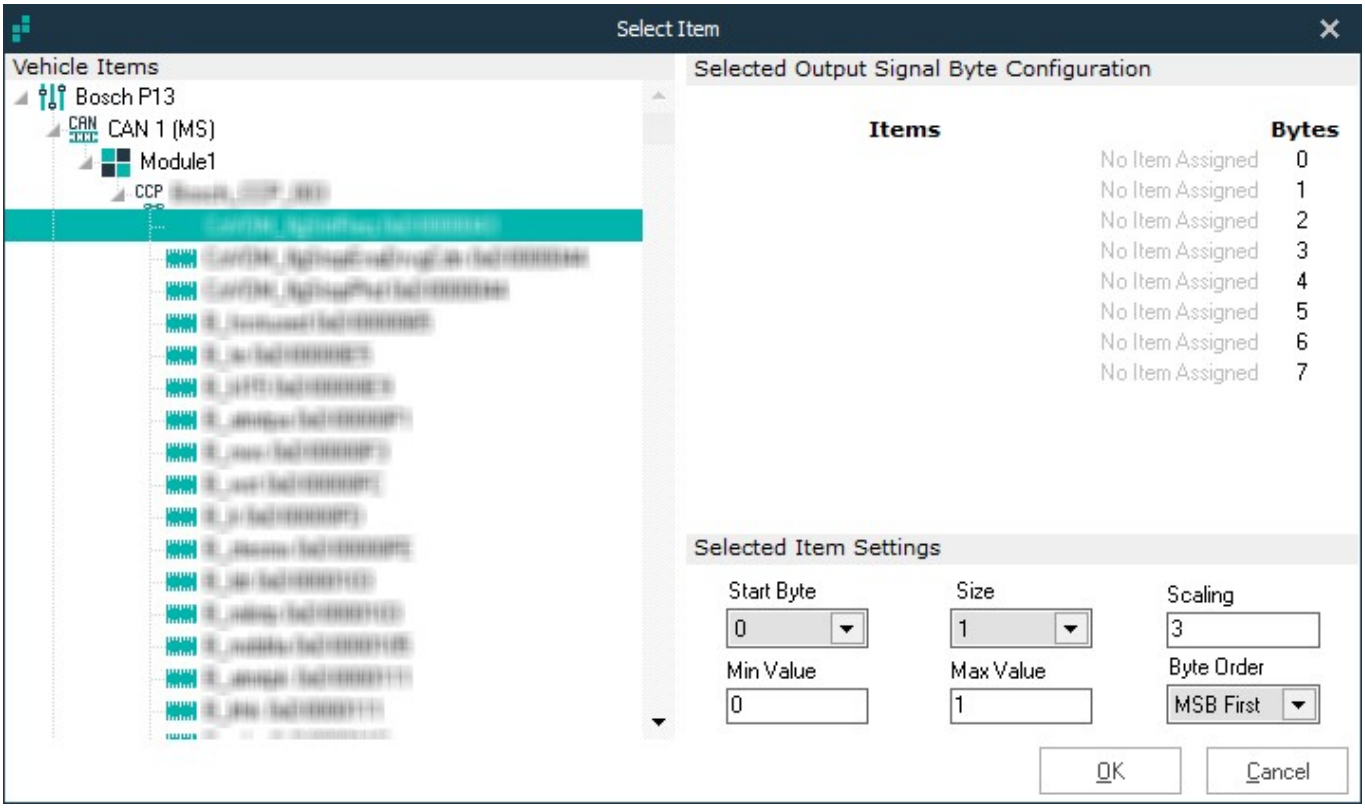
Edit Ident—Re-opens the ‘Output Identifier’ window above to allow the user to edit the settings for the selected ‘Output Identifier’.

Delete Ident—Removes the selected ‘Output Identifier’ from the ‘Output Signals’ window.

Adding Data Items to an Output Signal

Once an ‘Output Identifier’ has been created, ‘Data Items’ can be selected to fill the individual bytes of the associated CAN message. If more items are required a new ‘Output Identifier’ must be created to provide seven more data bytes.

Add Item—Allows the user to select the required ‘Data Items’. Opens the window shown below.



The ‘Select Item’ window displays the complete selected ‘Configuration Structure’. To select a ’Data Item’ to add to the ‘Output Signal’, click on the required item and the left hand panel will display its position in the current ‘Output Identifier’.

Selected Item Settings:

- Start Byte—Designates the Byte position in the CAN Messages the data for the item will begin.
- Size—Designates the number of bytes of data for the item.
- Scaling—Designates any scaling to be applied to the data values

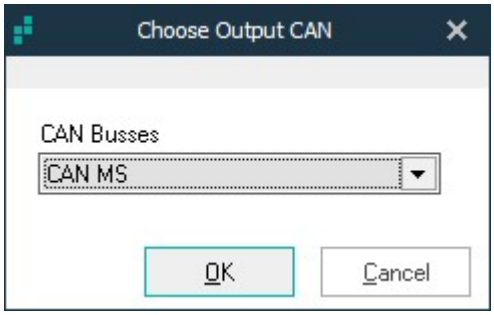
Edit Item—Opens the two right hand panels of the ‘Item’ window above to allow the user to edit the selected item.

Delete Item—Deletes the selected ‘Data Item’ from the ‘Output Identifier’.

Setting Output Signal CAN Bus

Once an ‘Output Signal’ has been created, the user must select the CAN Bus the signal will be transmitted on.

Set Output CAN—Allows the user to specify which of the Rebel data logger ‘CAN Buses’ the ‘Output Signal’ will be transmitted through. Opens the window shown below.



CAN Buses—Drop down menu selects the Output CAN Bus from the available connections on the Rebel Data Logger.

The ‘Output Signals’ window is shown below.

Exporting an Head Up Display File

The ‘Output Signal’ tool also contains a feature which allows the user to create a file designed to configure an Head Up display.

Export HUD—File-Exports the completed ‘Output Signal’ as a dedicated file to configure the Head-Up Display unit, providing an option of two display formats as shown below.

Clicking ‘OK’ closes the ‘Output Signal’ window and applies the settings to the ‘Configuration Structure’.

Exporting Rebel Dash File

The ‘Output Signal’ tool also contains a feature which allows the user to create a file designed to configure Rebel Dash display.

Export Rebel Dash—Creates a USB configuration stick for the Rebel Dash, you will need a blank USB pen drive that fits into the Rebel Dash and is compatible with it.

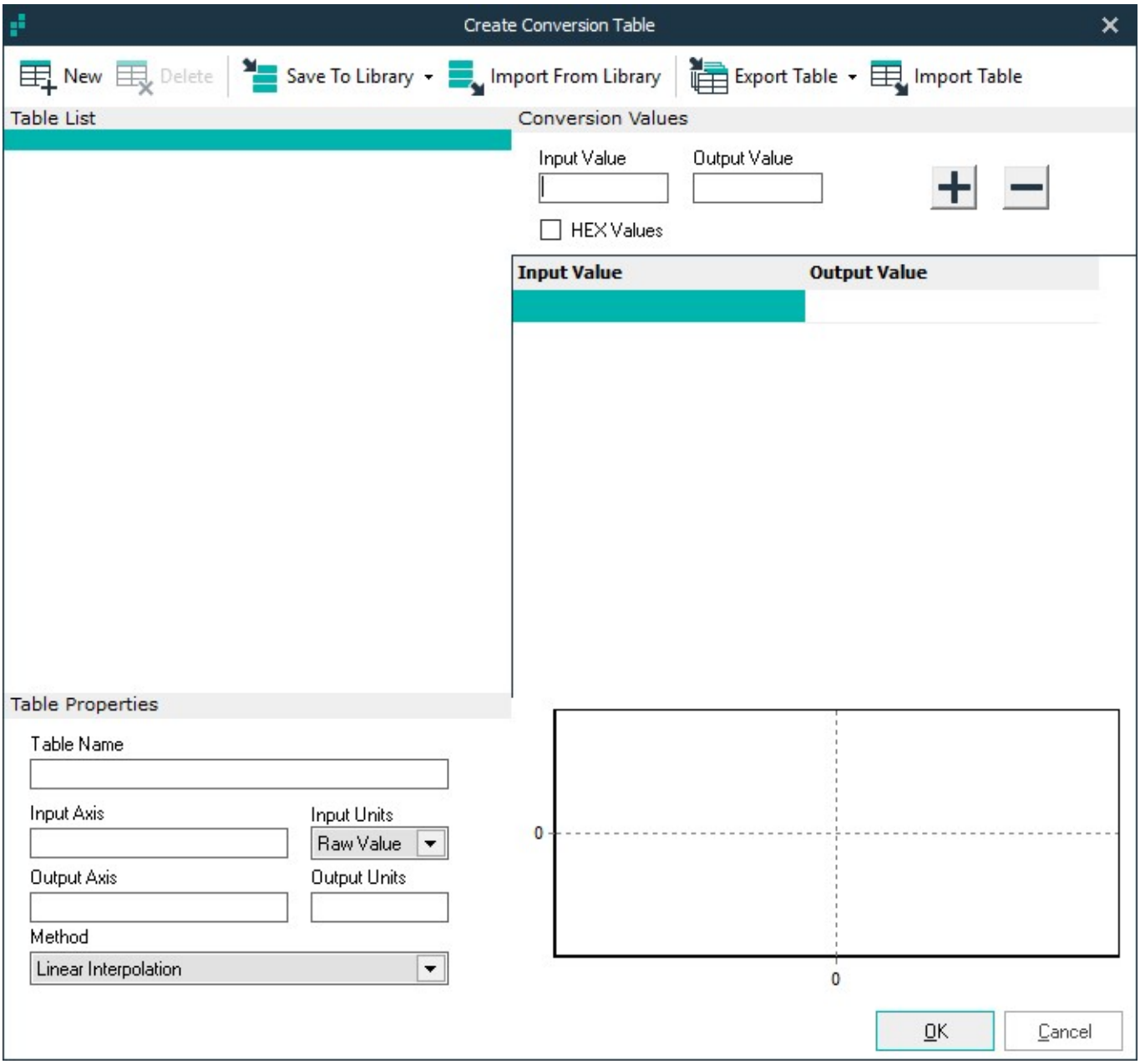
Exporting DBC File

Export DBC—Allows the user to export the selected output signal settings as a DBC file.

8.4—Conversion Tables

Conversion tables allow the user to automatically convert raw data to engineering units or apply any predetermined scaling. Using a conversion table to determine the method for converting data, the user is not dependant on a single formula. To create a new ‘Conversion Table’ use the ‘Local Projects’ panel ‘right click’ menu.

The ‘Conversion Table’ window is shown below.



The ‘Conversion Table’ window contains three main panels: The ‘Table List’ panel lists all existing ‘Conversion Tables’ for the selected ‘Configuration Structure’. The ‘Tables Properties’ panel lists all the details of the selected ‘Conversion Table’ and is used to edit or create a new table as required. The ‘Conversion Values’ panel then allows the user to input ‘Conversion Values’ into the table to construct the table.

Creating a Conversion Table

New—Creates a new entry in the 'Table List' panel, the user must then edit the settings to determine the new table.

Table Properties:

- Table Name—Allows the user to specify or edit the 'Conversion Table' name.
- Input Axis—Designates the input signal for the conversion table.
- Input Units—Specifies the units of the input signal.
- Output Axis—Designates the output signal for the 'Conversion Table'.
- Output Units—Specified the units of the output signal.
- Method—Drop down menu allows the user to select the method with which the converted outputs will be calculated.

Conversion Values:

- Input Value—Allows the user to give an input value with a known output value.
- Output Value—Allows the user to specify a known output value for the given input value.
- HEX Values—Selects the 'Values' to be displayed in Hexadecimal format.

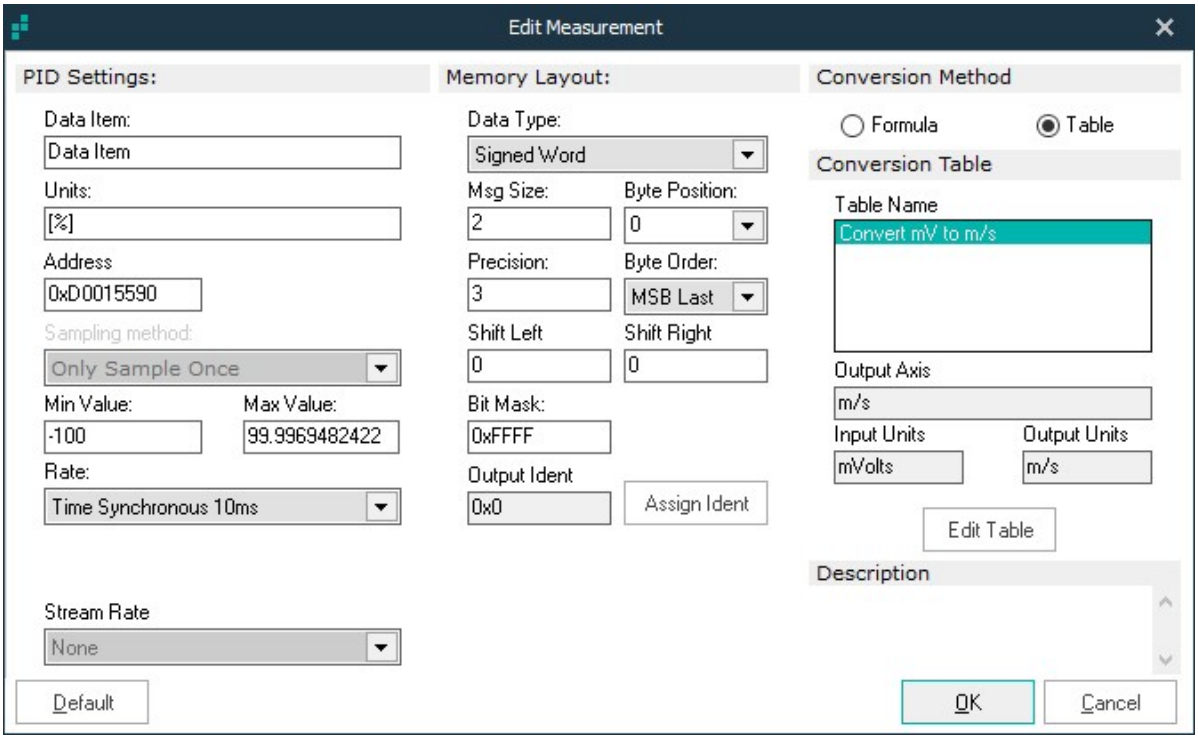
Importing a Conversion Table

The window also contains an 'Import Table' option which allows the user to import a 'Conversion Table' from elsewhere in the 'Local Projects' panel.

Import Table—Allows the user to copy a 'Conversion Table' already in existence

Assigning a Conversion Table

Once a 'Conversion Table' has been created it must be assigned. To do this a 'Data Item' must be selected and the 'Properties' window displayed as shown below.

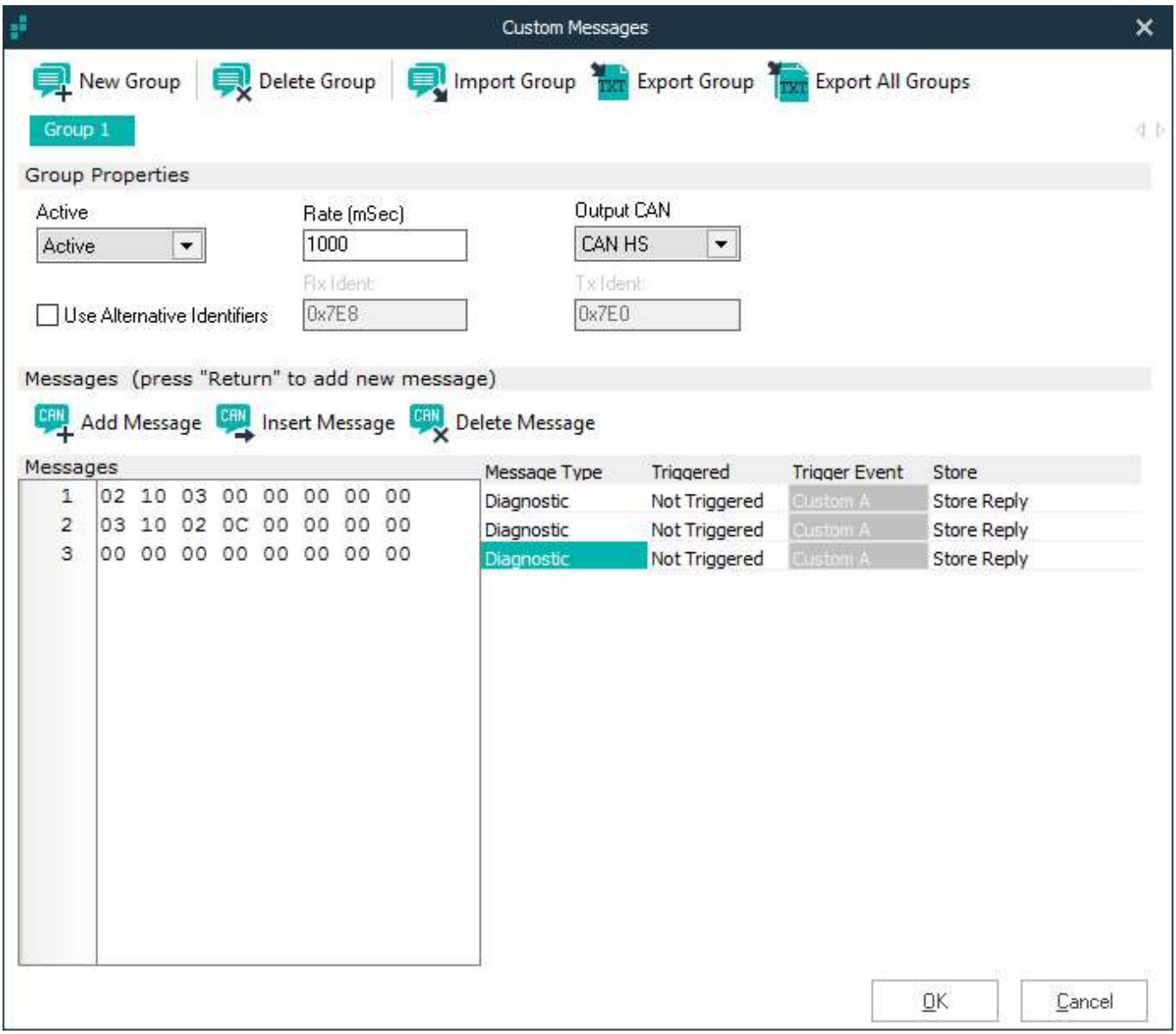


Selecting the 'Table' satellite button displays the 'Conversion Table' panel and allows the user to select the 'Conversion Table' to be applied to this 'Data Item' from the list. It also gives a brief summary of the 'Conversion Table' and the option to 'Edit Table, which reopens the 'Conversion Table' window.

8.5—Message Constructor

The ‘Message Constructor’ tool allows the user to create custom messages to be transmitted to a module by the Rebel. To create a new ‘User Message’ group use the ‘Local Projects’ panel ‘right click’ menu.

The ‘User Messages’ window is shown below.



The window allows user to create any custom message and to set the transmission settings.

Creating a User Message

The window opens with a ‘Group’ automatically open, messages can be created in ‘Groups’ with each subject to their own settings. ‘Groups’ can be created and deleted using the icons at the top of window. Once the required group has been created, to create a message simply begin typing the required message in the second byte of the message line. The zeros will automatically be replaced with the typed characters and the message length byte automatically adjusted as the message is constructed. Additional lines can be added or inserted and lines removed using the ‘Messages’ toolbar icons.

The window contains a number of settings:

Group Properties:

- Active—Allows the user to determine if the message group is currently active or not, and therefore whether it will be transmitted.
- Rate—Specifies the transmission rate.
- Output CAN—Drop down menu selects the CAN bus for the message transmission.
- Use Alternative Identifiers—Allows the user to specify to use alternative message identifiers for this message group.
- Rx Ident—Designates the identifier for the tester.
- Tx Ident—Designated the identifier for the receiving module.

Messages Properties: (For each individual message line.)

- Diagnostic—Allows the user to select to use the Diagnostic CAN message format for the current message line being created.
- Triggered—Allows the user to select if the transmission is linked to a 'Trigger' event.
- Trigger Event—Assigns the message group to a 'Trigger' 'Sample Method'.
- Store—Determines whether the reply to the message 'Group' is stored.

Once all the required settings have been determined and the message(s) constructed, click 'OK' to close the window and apply the changes to the 'Configuration Structure'.

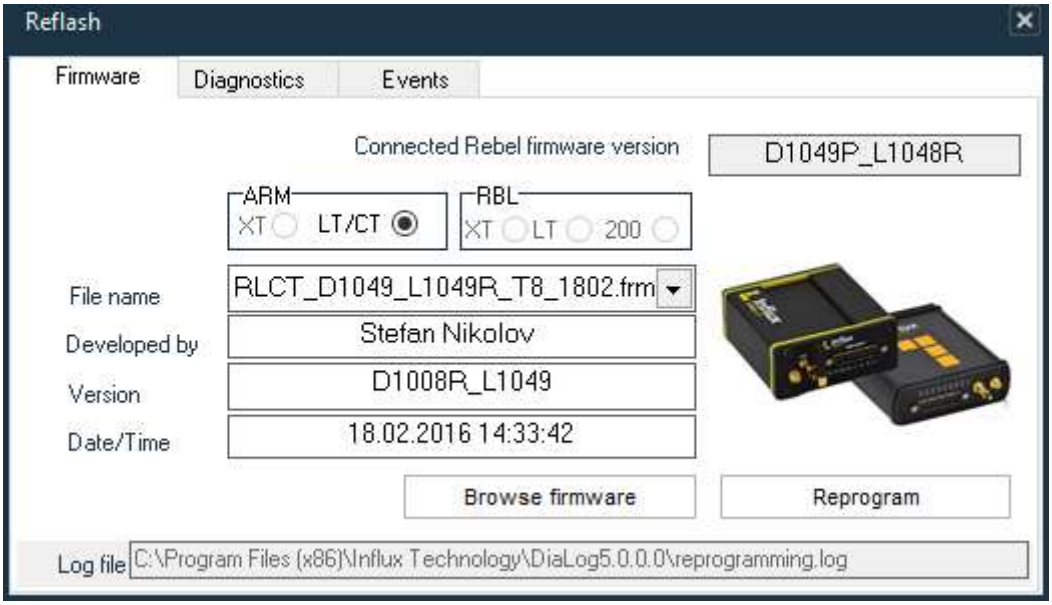
A—Appendix 1

This Appendix will consider the more advanced user settings within DiaLog to allow the full potential and flexibility of the software to be exploited.

A.1—Reflash

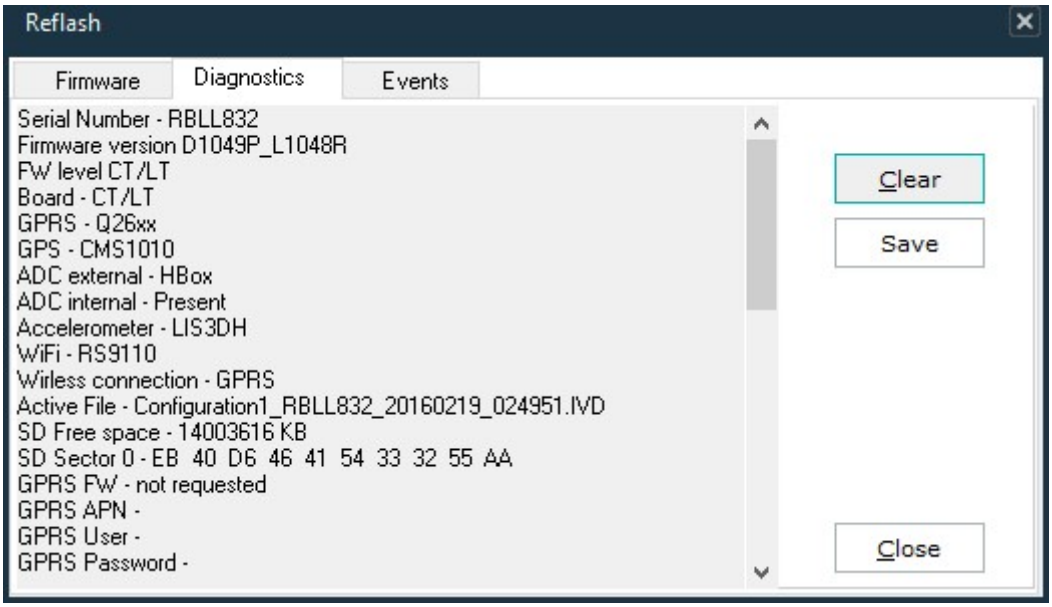
This section details the different settings available within the Reflash window for the Rebel data logger connected to the software The 'Reflash window' is accessed using the Logger Tab and menu button as shown below:

The 'Reflash' window is shown below. The window opens with the 'Firmware' tab as default.

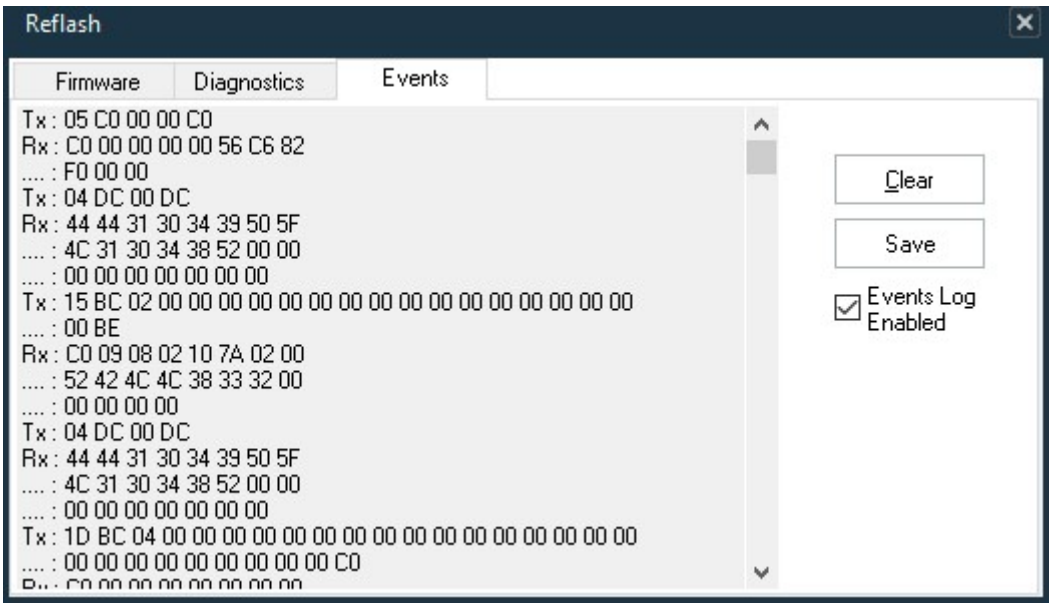


- Current Rebel Firmware Version—Specifies the firmware currently installed on the connected Rebel.
- File Name—Drop down menu selects the Firmware file.
- Developed by—Specifies the developer of the Firmware file selected.
- Version—Specifies the version of the firmware currently selected.
- Date/Time—Specifies the time the current firmware file was uploaded.

The Diagnostics Tab shown below allows you to easily identify your exact configuration:

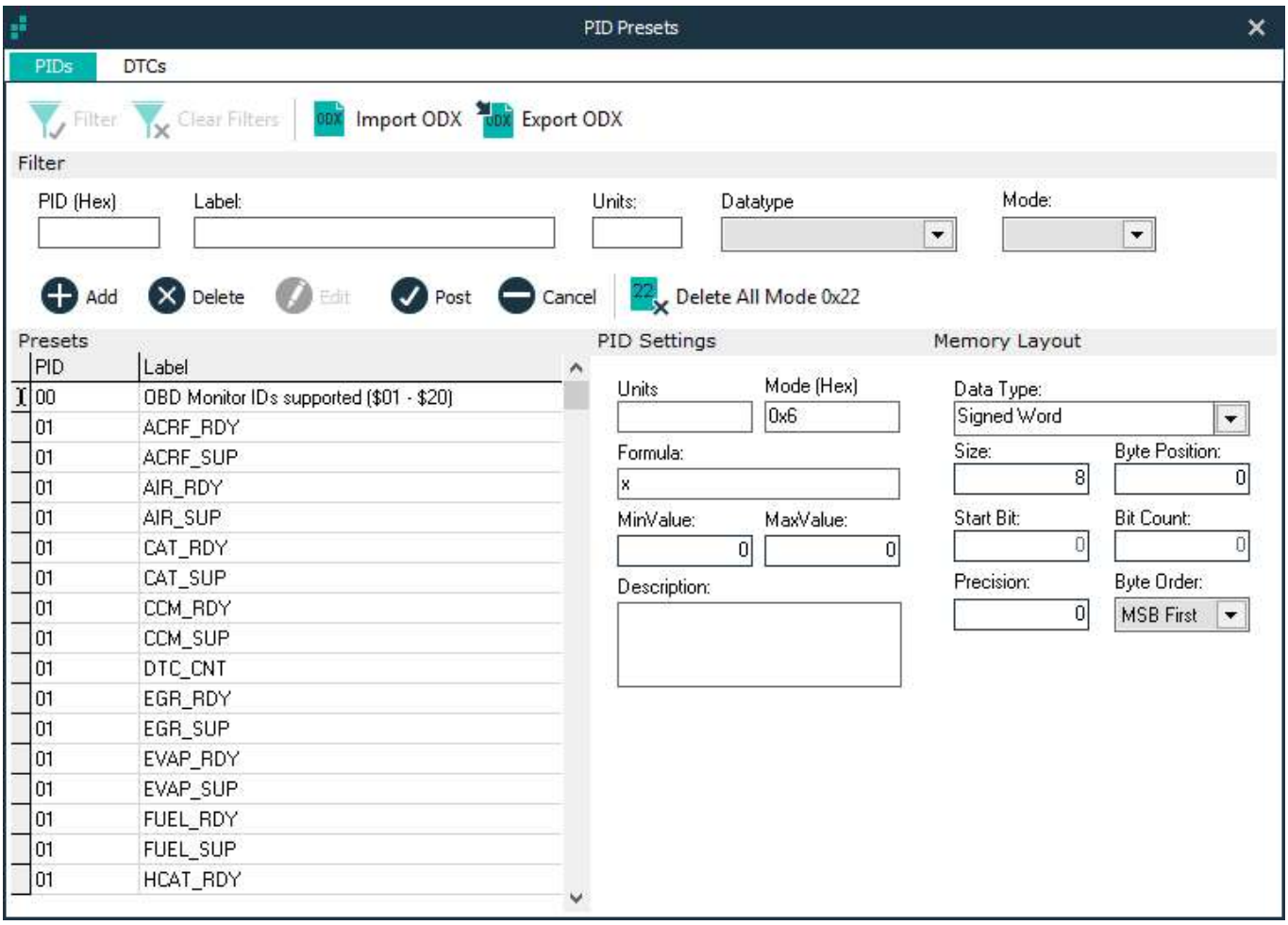


The Event Log details the communication that has occurred:



A.2—Edit PID Presets

This section details the facility for editing the 'PID Presets'. The 'PID Presets' window is shown below.



The window contains 'Filters' to allow the user to quickly identify the 'PID Preset' to be edited. Once the required 'PID Preset' has been identified and selected a summary of the settings is displayed the two right hand panels, the fields are user editable and the changes can be confirmed or cancelled using the 'Tick' and 'Cross' buttons. The toolbar also contains an option to delete all Mode 0x22 PID presets from the library.

PID Settings:

- Label—Designates the name of the 'PID Preset'.
- Units—Specified the units.
- PID—Hexadecimal address for the PID.
- Mode—Designates the Diagnostic Service utilised to read the PID.
- Formula—Allows a conversion formula to be specified to be automatically applied.
- Min Value—Allows the determination of a minimum permitted value for the PID.
- Max Value—Allows the determination of a maximum permitted value for the PID.

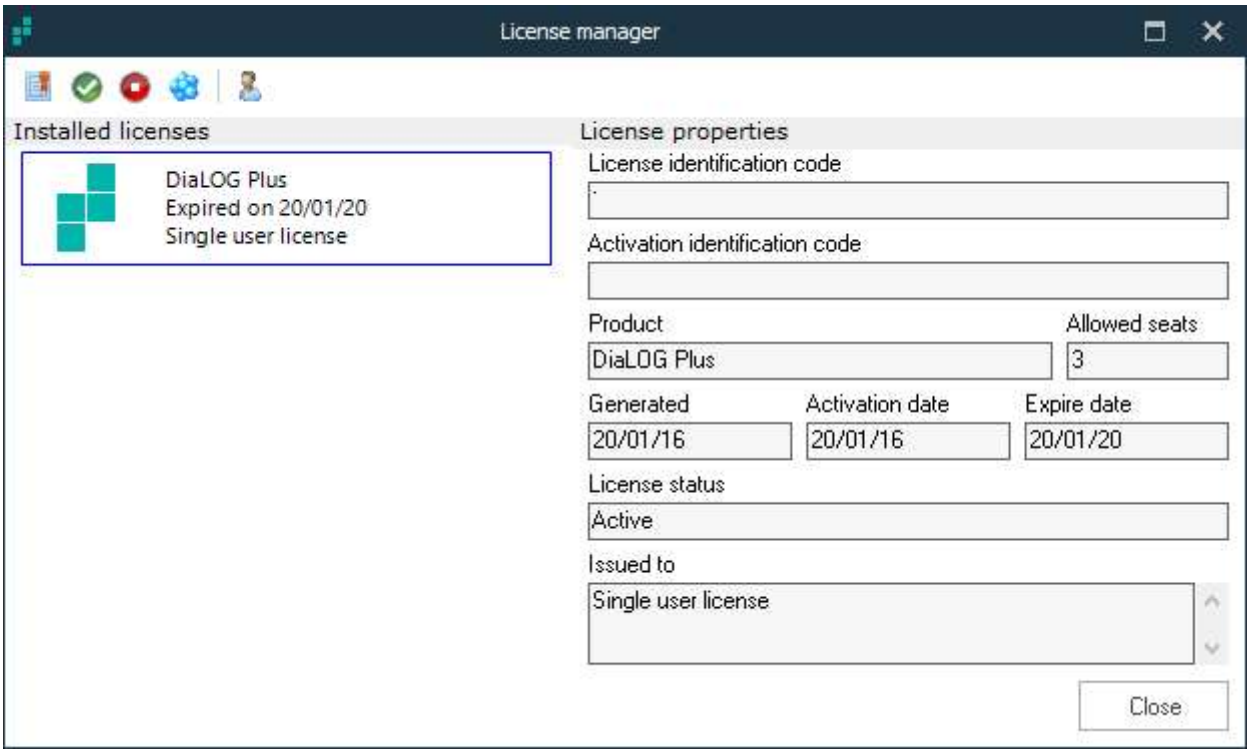
Memory Layout:

- Data Type—Drop down menu selects the data type for the PID.
- Size—Designates the number of bytes for each data item.
- Byte Position—Location of first data byte in returned CAN message.
- Start Bit
- Bit Count
- Precision—Displayed decimal places.
- Byte Order—Selects the order in which the data bytes for the PID are transmitted.

A.3—License Manager

All Influx Technology products are licensed through a central database system. Each product allows the user to manage the licenses for the computer it is installed on. The license manager is accessed through the Help ‘Navigation Tab’ menu as shown below.

The License Manager for all software licenses opens as shown below.



For full details of Influx Technology product licensing please see the Product Licensing Guide.

A.4—Protocol Priorities

This section details the working priorities within a Configuration Structure regarding CCP and Diagnostic protocols. If either of these protocols is present in structure by themselves then there are no priorities to be considered. However, if both protocols are present then in a single configuration, then the priority needs to be considered by the user.

In the case of both CCP and Diagnostic protocols running, the CCP protocol has the priority as shown below.

- When the logger is powered up, it will first attempt to communicate via CCP to establish the connection.
- Once the CCP/xCP connection has been established then the module will attempt to communicate via the Diagnostic protocol.
- If no CCP connection can be established then the logger will not attempt communication via the Diagnostic protocol.

This means that the CCP module is the master and has priority. Therefore the user must always ensure, that if a structure is configured with a CCP protocol, that this connection can be established.

This priority is established to stop any unwanted waking of modules by Diagnostic polling. Only when the vehicle is awake and therefore allowing CCP/xCP communication, will Diagnostic polling be possible.

B—Appendix 2

This Appendix contains a number of user aids and references, designed to help understanding of the different services and protocols utilised in the software to enable fully exploitation of the software abilities by the user.

B.1—Glossary

Terminology	Definition
A2L	ASAM MCD 2 MC-language
CAN	Controller Area Network
CCP	CAN Calibration Protocol
CSV	Comma Separated Values file
DBC	CAN Database file
DPV	DiaLog Project Vehicles file
DTC	Diagnostic Trouble Code
EEPROM	Electrically Erasable Programmable Read-Only Memory
FAT32	File Allocation Table 32 bit
FEPS	Flash EEPROM Programming Signal
IVD	Influx Vehicle Data file
IVS	Influx Configuration Structure file
KML	GPS data file extension—supported by Google
LIN	Local Interconnect Network
LDF	LIN Database File
LSB	Least Significant Byte
MSB	Most Significant Byte
OBD	On-Board Diagnostics
ODX	Open Diagnostics Exchange file
PID	Periodic Identifier
ROB	
TXT	Text file

B.2—CAN Modes

01	Current Powertrain Diagnostic Data
02	Powertrain Freeze Frame Data
03	Emissions Related Powertrain Diagnostic Trouble Codes
04	Clear/Reset Emissions Related Diagnostic Information
06	On-Board Monitoring Test Results for Non-Continuously Monitored Systems
07	On-Board Monitoring Test Results for Continuously Monitored Data
09	Request Vehicle Information
0A	Permanent Status Diagnostic Trouble Codes
10	Diagnostic Session Control Service
11	ECU Reset
14	Clear Diagnostic Information
19	Read Diagnostic Trouble Codes
22	Read Data by Identifier
23	Read Memory by Address
2C	Dynamically Define by Data Identifier
2E	Write Data by Identifier
31	Routine Control
3E	Tester Present
27	Security Access Service
2A	Read Data by Periodic Identifier

B.3—CAN Definitions

Protocol Control Information Name	Symbol	Byte 1								Byte 2	Byte 3
		7	6	5	4	3	2	1	0		
Single Frame	SF	0	0	0	0	DL				N/A	N/A
First Frame	FF	0	0	0	1	DL high				DL low	N/A
Consecutive Frame	CF	0	0	1	0	SN				N/A	N/A
Flow Control Frame	FC	0	0	1	1	FS				BS max	ST min

- Single Frame (SF) – Protocol for short messages, contained in one frame, includes a length descriptor.
    - Data Length (DL) – Encoded in at the beginning of the message, the PCI is not included in the data length calculation. DL high and DL low encodes the data length for long messages into twelve bits, allowing a message length of up to 4095 bytes.
- First Frame (FF) – The procedure for starting a long message, to be therefore segmented into multiple frames. It is only generated once for each long message, by the sender of the segmented transfer.
    - Data Length (DL) – DL high and DL low encodes the data length for long messages into twelve bits, allowing a message length of up to 4095 bytes.
- Flow Control Frame (FC) – Used in a long message to control the Consecutive Frame transmissions. Generated by the receiver of a long message, it is the response to a First Frame or the last Consecutive Frame.
    - Flow Status (FS) – Codes in the PCI of the Flow Control Frame, it instructs the Consecutive Frame transmission, with two possible values:
        - Clear to Send (CTS, 000B) – Resume message transmission, BS max and ST min taken into account by sender on reception of the Flow Control frame.
        - Wait (WT, 001B) – Pause transmission and wait for a CTS FC frame. ECU will only except not generate.
    - Block Size (BS max) – Designates the maximum number of Consecutive Frames that are accepted in a block (between two Flow Control frames.) Possible values:
        - 0 – No other Flow Control frame expected, therefore sender free to transmit all the following Consecutive Frames with the ST min value.
        - 1 BS max 255
    - Separation Time (St min) – Specifies the minimum gap between the transmission of the Consecutive Frames only and not between the Flow Control frame and the next Consecutive Frame. Units are milliseconds.
- Consecutive Frame (CF) – When sending segmented data in a long message, all frames from sender containing the data are encoded as Consecutive Frames. On receipt of Consecutive Frames the receiver shall assemble the data bytes until whole message received.
    - Sequence Number (SN) – Designated the Consecutive Frame number in the current block. Used to detect duplication or loss of Consecutive Frames from a long message.

B.4—Standard OBD Periodic Identifiers

PID	Symbol	Units	Description
00			Supported PIDs 01-20
01			Status since DTCs cleared (Includes MIL and DTC status and number)
02			Freeze DTC
03	FUELSYS		Fuel system status
04	LOAD_PCT	%	Calculated engine load value
05	ECT	Deg C	Engine coolant temperature
09	SHRTFT1	%	Short term fuel trim (bank 1)
07	LONGTFT1	%	Long term fuel trim (bank 1)
08	SHRTFT2	%	Short term fuel trim (bank 2)
09	LONGTFT2	%	Long term fuel trim (bank 2)
0A	FRP	kPa	Fuel rail pressure
0B	MAP	kPa	Intake manifold absolute pressure
0C	RPM	rpm	Engine Speed
0D	VSS	km/h	Vehicle speed
0E	SPARKADV	Deg	Timing advance (cylinder 1)
0F	IAT	g/s	Intake air temperature
10	MAF	%	Mass air flow
11	TP	%	Throttle position
12			Commanded secondary air status
13			Oxygen sensors present
14	O2S11	V	Oxygen sensor 1 (bank 1)
15	O2S12	V	Oxygen sensor 2 (bank 1)
16	O2S13	V	Oxygen sensor 3 (bank 1)
17	O2S14	V	Oxygen sensor 4 (bank 1)
18	O2S21	V	Oxygen sensor 1 (bank 2)
19	O2S22	V	Oxygen sensor 2 (bank 2)
1A	O2S23	V	Oxygen sensor 3 (bank 3)
1B	O2S24	V	Oxygen sensor 4 (bank 2)
1C			OBD standard vehicle compliancy
1D			Oxygen sensors present
1E	PTO_STAT		Auxiliary input status
1F		s	Run time since engine start
20			Supported PIDs 21-40
21	MIL_DIST	km	Distance travelled with MIL lamp
22		kPa	Fuel rail pressure (relative to manifold vacuum)
23	FRP_FF	kPa	Fuel rail pressure (diesel)
24		V	Oxygen sensor 1 wide band lambda equivalence ratio
25		V	Oxygen sensor 2 wide band lambda equivalence ratio
26		V	Oxygen sensor 3 wide band lambda equivalence ratio
27		V	Oxygen sensor 4 wide band lambda equivalence ratio

PID	Symbol	Units	Description
28		V	Oxygen sensor 5 wide band lambda equivalence ratio
29		V	Oxygen sensor 6 wide band lambda equivalence ratio
2A		V	Oxygen sensor 7 wide band lambda equivalence ratio
2B		V	Oxygen sensor 8 wide band lambda equivalence ratio
2C		%	Commanded exhaust gas recirculation
2D		%	Exhaust gas recirculation error
2E		%	Commanded evaporative purge
2F	FLI	%	Fuel level input
30			Number of warm ups since codes cleared
31		km	Distance travelled since codes cleared
32		Pa	Evaporative system vapour pressure
33	BARO	kPa	Barometric pressure
34		mA	Oxygen sensor 1 wide band lambda equivalence ratio
35		mA	Oxygen sensor 2 wide band lambda equivalence ratio
36		mA	Oxygen sensor 3 wide band lambda equivalence ratio
37		mA	Oxygen sensor 4 wide band lambda equivalence ratio
38		mA	Oxygen sensor 5 wide band lambda equivalence ratio
39		mA	Oxygen sensor 6 wide band lambda equivalence ratio
3A		mA	Oxygen sensor 7 wide band lambda equivalence ratio
3B		mA	Oxygen sensor 8 wide band lambda equivalence ratio
3C	CATEMP11	Deg C	Catalyst temperature sensor 1 (bank 1)
3D	CATEMP21	Deg C	Catalyst temperature sensor 1 (bank 2)
3E	CATEMP12	Deg C	Catalyst temperature sensor 2 (bank 1)
3F	CATEMP22	Deg C	Catalyst temperature sensor 2 (bank 2)
40			Supported PIDs 41-60
41			Monitor status (this drive cycle)
42	VPWR	V	Control module voltage
43	LOAD_ABS	%	Absolute load value
44	EQ_RAT		Command equivalence ratio
45	TP_REL	%	Relative throttle position
46	AAT	Deg C	Ambient air temperature
47		%	Absolute throttle position B
48		%	Absolute throttle position C
49		%	Accelerator pedal position D
4A		%	Accelerator pedal position E
4B		%	Accelerator pedal position F
4C		%	Commanded throttle actuator
4D		mins	Time run with MIL on
4E		mins	Time since DTCs cleared
51			Fuel type
52		%	Ethanol fuel
53		kPa	Absolute evaporative system vapour pressure
54		kPa	Evaporative system vapour pressure
55			Short term secondary oxygen sensor trim (bank 1 and 3)
56			Long term secondary oxygen sensor trim (bank 1 and 3)
57			Short term secondary oxygen sensor trim (bank 2 and 4)
58			Long term secondary oxygen sensor trim (bank 2 and 4)

PID	Symbol	Units	Description
59		kPa	Absolute fuel rail pressure
5A		%	Relative accelerator pedal position
5B			Hybrid battery pack remaining life
5C		Deg C	Engine oil temperature
5D			Fuel injection timing
5E			Engine fuelling rate
5F			Emission requirements vehicle designed to meet
61			Driver engine demand
62		%	Actual engine torque
63			Engine reference torque
64		%	Engine torque
65			Auxiliary in/output supported
66			Mass air flow sensor
67		Deg C	Engine coolant temperature
68		Deg C	Intake air temperature sensor
69			Commanded exhaust gas recirculation and EGR error
6A			Commanded diesel intake air flow control and relative intake air flow position
6B		Deg C	Exhaust gas recirculation temperature
6C			Commanded throttle actuator control and relative throttle position
6D			Fuel pressure control system
6E			Injection pressure control system
6F			Turbocharger compressor inlet pressure
70			Boost pressure control
71			Variable geometry turbine control
72			Wastegate control
73			Exhaust pressure
74		rpm	Turbocharger speed
75		Deg C	Turbocharger temperature
76		Deg C	Turbocharger temperature
77		Deg C	Charge air cooler temperature
78		Deg C	Exhaust gas temperature
79		Deg C	Exhaust gas temperature
7A			Diesel particulate filter
7B			Diesel particulate filter
7C			Diesel particulate filter
7D			NOx NTE control area status
7E			Particulate matter NTE control area status
7F			Engine run time
81			Engine run time for auxiliary emissions control device
82			Engine run time for auxiliary emissions control device
83			Nox sensor
84		Deg C	Manifold surface temperature
85			NOx reagent system
86			Particulate matter sensor
87		kPa	Absolute intake manifold pressure