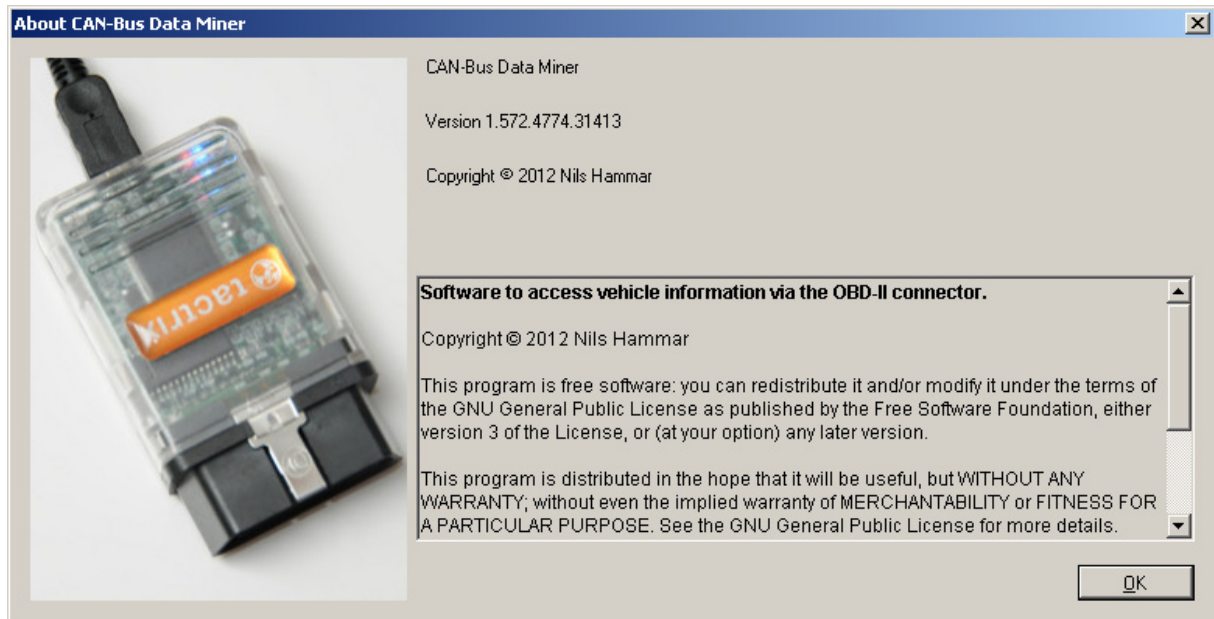


CAN Data Miner



Software to access vehicle information via the OBD-II connector.

Contents

CAN Data Miner	1
Software to access vehicle information via the OBD-II connector.....	1
Introduction.....	3
Why.....	3
Overview	3
Disclaimer	3
Protocols & Features.....	4
Known Bugs/Limitations.....	4
Installation	5
Execution.....	6
Configuration	9
Config Parameters	10
Communication Speeds.....	10
Units.....	11
PID Groups	11
PID Group	11
Item ID.....	12
Data.....	12
Modes	14
Vehicles	15
Vehicle Table.....	15
General Tab	15
ECU and PID Groups Tab	16
Addresses Tab	16
Flags and Parameters Tab.....	17
Connecting	18
Interface.....	19
Smart Serial Interface	21
Protocol	22
CAN Logging	24
OBD-II.....	26
Current Data	27
Chart data	28
Snapshot Data	29
Howtos.....	30
Data Log	30
Supported Hardware Reference	32
Unsupported Devices	33

Introduction

Why

Why make just another tool for the CAN-bus when there are so many tools available already? I have two reasons;

1. Learning how it really works, it's useful as an added experience.
2. Because I can.

What I want to provide to the world is a flexible and configurable tool. This will of course also mean that it may be complicated for the average person to understand every detail.

Also notice that for J2534 devices there is no automatic detection of protocol. This is one of the current limitations of the application.

This tool is still under development so this manual may not be accurate at all times.

Overview

At installation you will get a set of default values in the tool, and the vehicle that I have tested on is a Subaru, which means that some parts are specific for that brand and that if you test on another vehicle you may need to change the configuration for that vehicle.

In the document there are references to PID, it may in some cases be seen as "PID or other item", e.g. address, TID etc.

Information that is obvious is intentionally left out – like explanation of Name fields.

Disclaimer

Data provided together with this application is provided as-is and may not be entirely correct. Especially when it comes to data that is specific for a vehicle brand or model.

Protocols & Features

Supported protocols are: J1850 VPW & PWM, ISO9141, ISO14230, ISO 15765 (11 and 29 bit) and raw CAN. Notice that the actual support also depends on the interface device.

The application supports a number of OBD adapters, some J2534, some serial with AT-commands. The first page of the application displays the supported adapters.

The current version will look up J2534 adapters from the registry so even if your adapter isn't listed it may still work. Notice that the adapter must support the 04.04 version of the J2534 API at the moment. The older version is not supported. If you don't know which version your adapter support you can always try and see if it is discovered or not.

One of the features of this application is that it supports multiple adapters at the same time so you can connect two vehicles at the same time and compare data from them as long as you use different adapters. Multiple adapters of the same model is not supported. Just watch out for stray currents if you connect two vehicles at the same time and you for example use battery chargers on them or if there is another connection between them.

Known Bugs/Limitations

- The Tactrix adapter seems to not have complete support for 29 bit addressing.
- The ISO 9141 support on the Volvo UWA seems to be incomplete.

Installation

This application shall be distributed in a ZIP file where the MSI file, this document and a Setup.exe file shall be present. As you read this you have probably already unpacked the ZIP file into an empty directory.

If you have an earlier version of this program installed I recommend you to uninstall that version first.

Execute the Setup.exe file and install the program using the default values.

If you have a normal installation you it will be installed at the following locations:

Windows 7 64-bit (x64 version)

Executable	C:\Program Files (x86)\Bedug.com\CAN Data Miner
Data	C:\ProgramData\Bedug.com\CAN Data Miner

Windows 7 32-bit (x86 version)

Executable	C:\Program Files\Bedug.com\CAN Data Miner
Data	C:\ProgramData\Bedug.com\CAN Data Miner

Windows XP

Executable	C:\Program Files\Bedug.com\CAN Data Miner
Data	C:\Documents and Settings\All Users\Application Data\Bedug.com\CAN Data Miner

Most of the testing has been done under 64-bit Windows 7, but the application is built for 32-bit and should work well there too.

You should try to find the data directory, since the files there will be updated if you change the configuration. And if you uninstall the program the data files will be removed. So it may be a good idea to copy the files to a safe location before you update the application. Notice that a new version of the application may not be compatible with the old files, even if I'm trying to avoid changes that are incompatible.

If all goes well with the installation you will find the program in the start menu under **Bedug.com**.

Execution

This program can be used without an adapter, but you will in that case not be able to communicate with the vehicle for obvious reasons. There is a simulated driver alternative that may be used if you like to try it out without connecting it to a car. However the simulated driver is a bit limited in functionality.

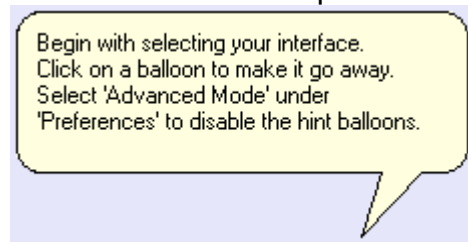


At the first page there is a tree view to the left with the interfaces and the preferences branches. The first page displayed contains a display of the supported devices and some devices that aren't supported. The items will get a border that indicates the level of support provided as listed in the following table:

Color	Support
Green	Supported and recognized. Notice that serial devices are set as recognized as soon as the system has a serial port so it's a bit of false advertising here.
Gray	Supported but not recognized.
Yellow	Currently not supported, will be added in future version.
Red	Won't be supported.

If you have a J2534 adapter that the application supports it must be connected and the drivers for it loaded before the application is started.

If you don't have "Advanced Mode" selected in the preferences page you will get a lot of hint balloons with tips on various items:



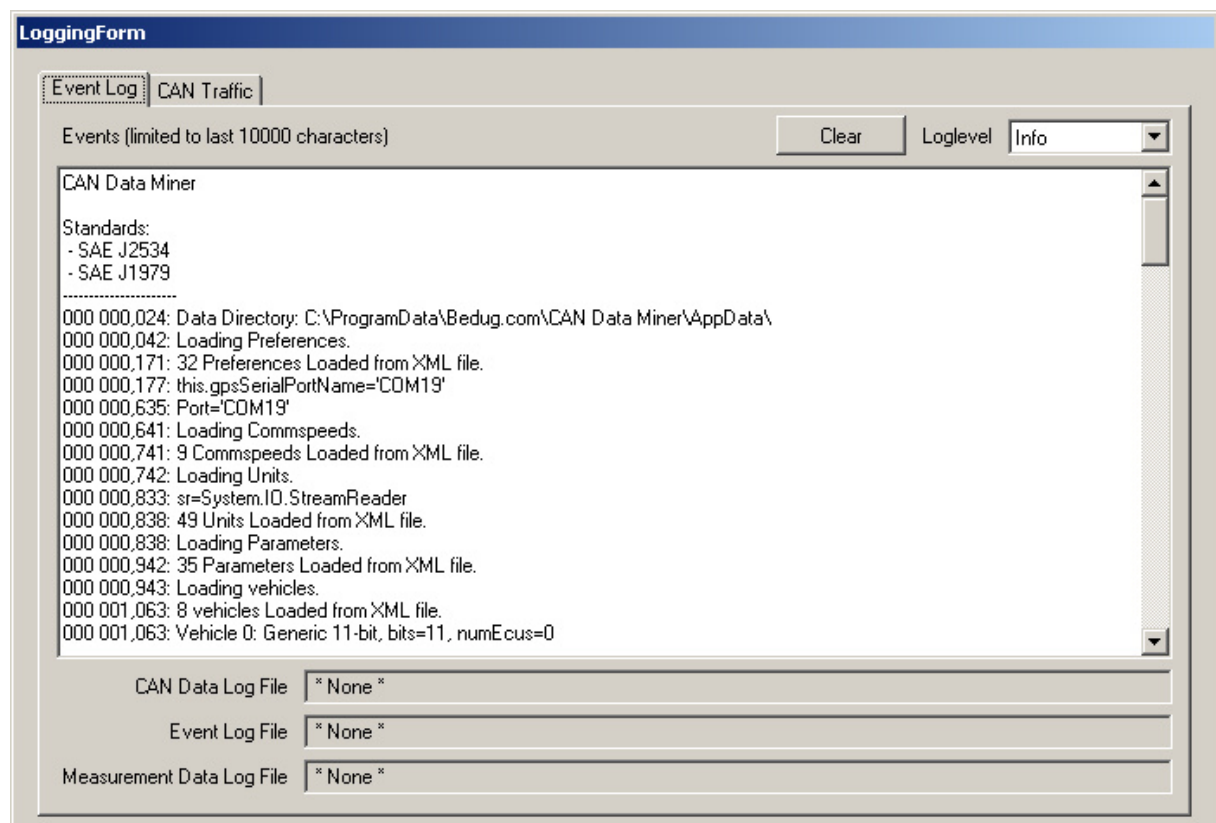
To hide a single one for the moment you can click on it. But it will reappear when you move the window to which it's pointing.

The **File** menu will give you the option to open and close log files of various kinds.

- CAN Data log file – this is a file written in the Vector Canalyzer ASC format and is only available when using the CAN protocol. The ASC format is a text format.
- Event log file – this is a file that gets the same information as is written in the log window.
- Measurement data log file – this file is in the Microsoft Excel CSV format and contains sampled data from the vehicle. One column per data source, data sources are selected before logging is started.

Event logging is done in a separate window to allow for some flexibility. It also contains some information about open log files.

The **Event Log** menu alternative will bring forward the log window in case it has been hidden.

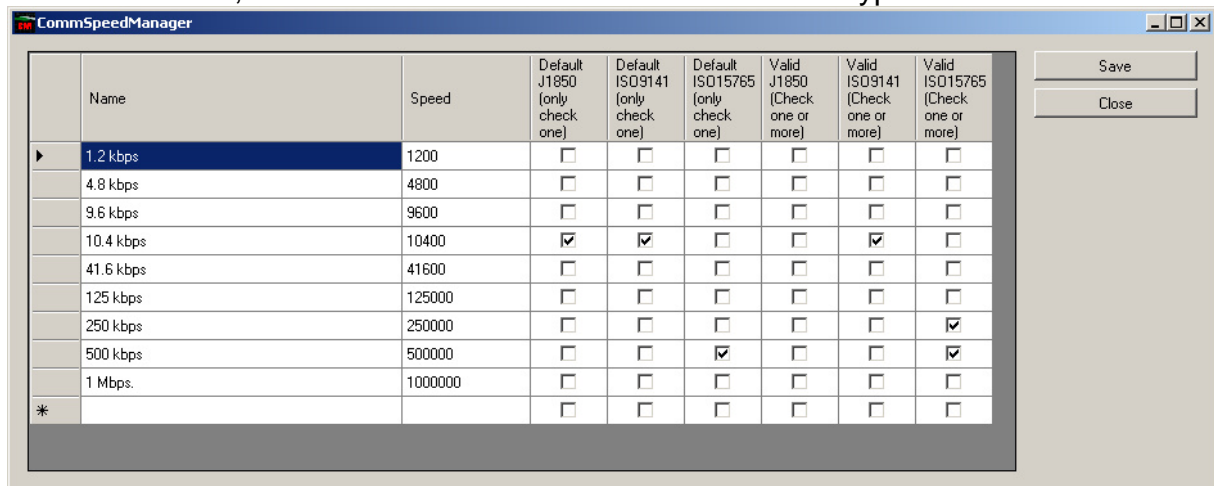


Configuration

Under this menu item there are several alternatives, and each of them will be described.

For simplicity I have tried to use the Windows controls in their default manner, and I do a quick intro here:

To add a record, select the last line in the table and start to type.

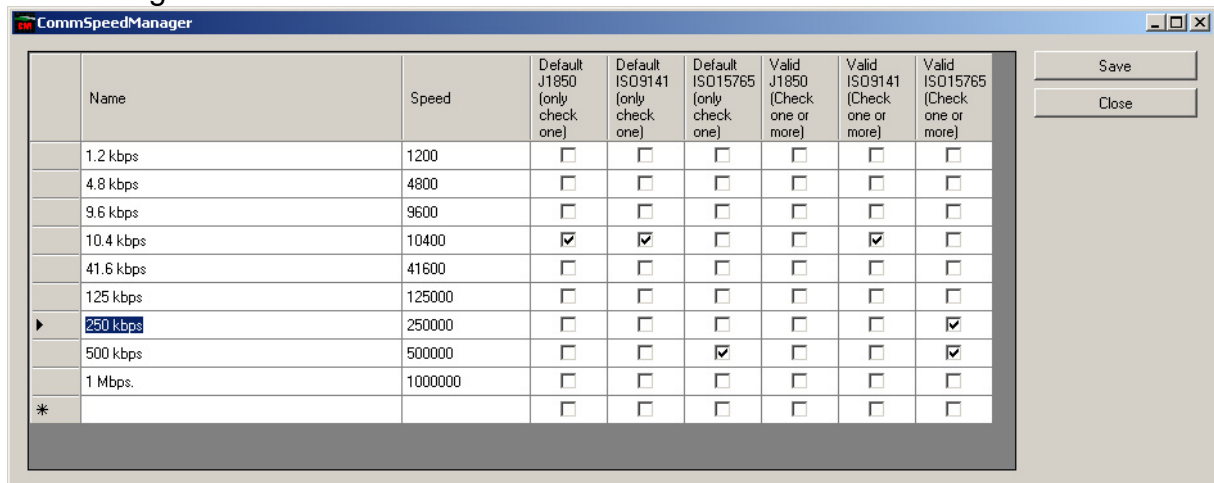


The screenshot shows the 'CommSpeedManager' application window. It contains a table with the following columns: Name, Speed, Default J1850 (only check one), Default ISO9141 (only check one), Default ISO15765 (only check one), Valid J1850 (Check one or more), Valid ISO9141 (Check one or more), and Valid ISO15765 (Check one or more). The '1 Mbps.' row is selected, and a cursor is visible in the empty row below it. There are 'Save' and 'Close' buttons on the right side of the window.

Name	Speed	Default J1850 (only check one)	Default ISO9141 (only check one)	Default ISO15765 (only check one)	Valid J1850 (Check one or more)	Valid ISO9141 (Check one or more)	Valid ISO15765 (Check one or more)
1.2 kbps	1200	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.8 kbps	4800	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.6 kbps	9600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.4 kbps	10400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
41.6 kbps	41600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
125 kbps	125000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
250 kbps	250000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
500 kbps	500000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 Mbps.	1000000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In a few cases you will need to double-click on the empty row to add data in a separate form instead.

To update data you will select the field you want to update and click on it with the mouse to get it into edit mode.



The screenshot shows the 'CommSpeedManager' application window. The '250 kbps' row is selected, and a cursor is visible in the empty row below it. There are 'Save' and 'Close' buttons on the right side of the window.

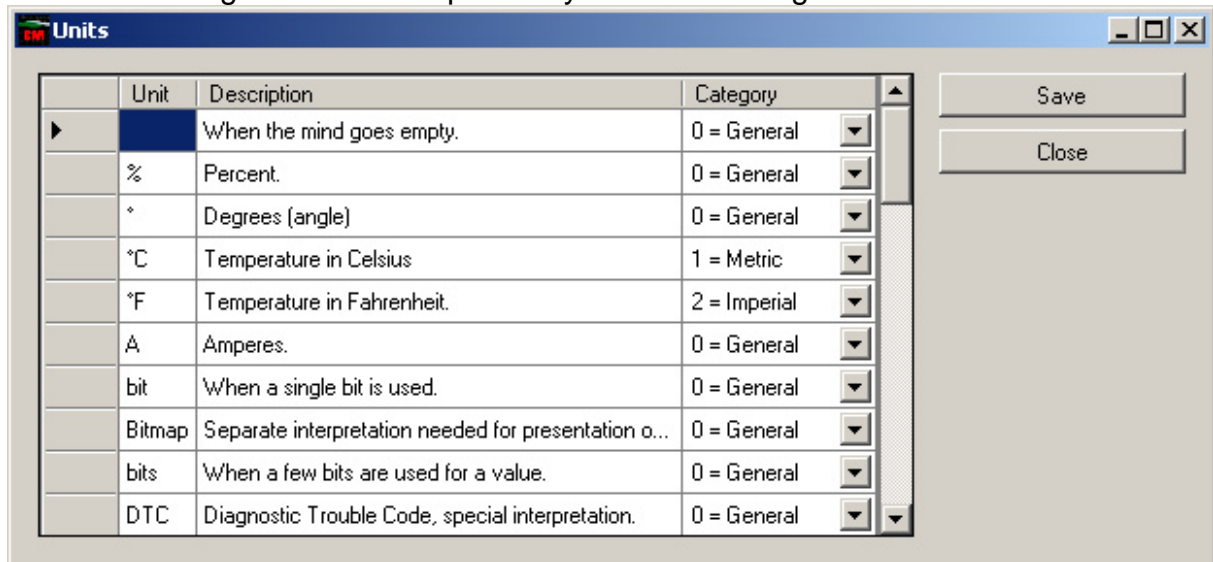
Name	Speed	Default J1850 (only check one)	Default ISO9141 (only check one)	Default ISO15765 (only check one)	Valid J1850 (Check one or more)	Valid ISO9141 (Check one or more)	Valid ISO15765 (Check one or more)
1.2 kbps	1200	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.8 kbps	4800	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.6 kbps	9600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.4 kbps	10400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
41.6 kbps	41600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
125 kbps	125000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
250 kbps	250000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
500 kbps	500000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 Mbps.	1000000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To delete data you need to select the whole row and press the **Del** button on the keyboard. A confirmation pop-up shall appear to prevent you from accidental deletes.

Units

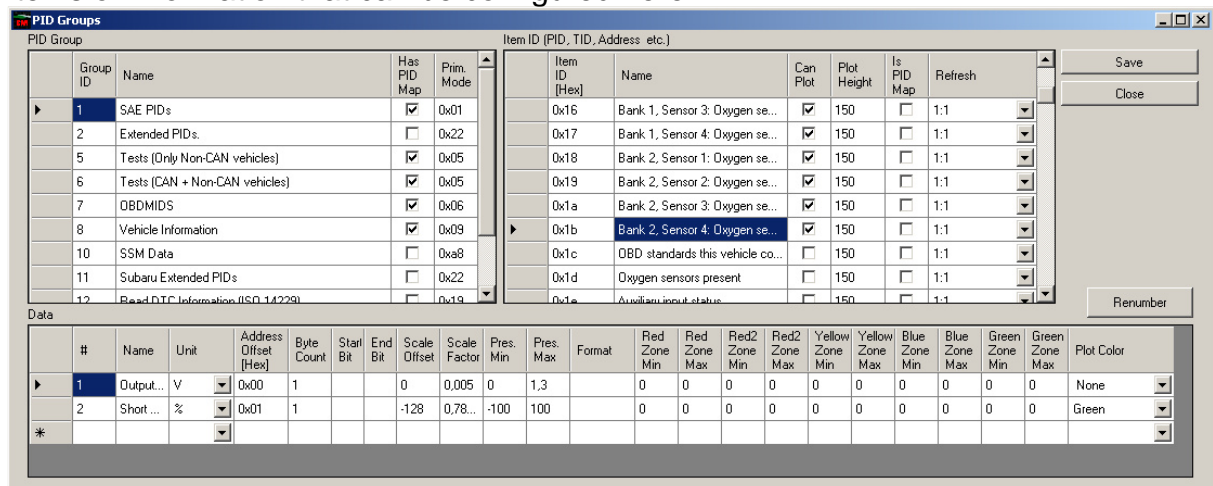
This page allows you to configure units of various types to be used during presentation, and you can also categorize them. This is intended to allow for filtering between Metric and Imperial units at presentation.

There is a safeguard built in to prevent you from deleting a unit that is used.



PID Groups

The PID group page is one of the key pages in the application. There are several items of information that can be configured here.



PID Group

The **PID Group** is an administrative item to group the data items in different categories. Some PID groups has PID maps, that is when a specific PID contains information about which other PIDs that are supported.

The **Group ID** column contains an unique numeric identifier for that group.

The **Prim Mode** column contains the primary mode for the PID group, it can be used to select default mode value when a specific PID Group is selected.

Item ID

The **Item ID** is the table for all items within a PID group. This is PIDs, Addresses and other items.

The column **Item ID** must contain a hex value of the form **0xNN**. That value is used in communication with the ECU.

The **Can Plot** column indicates if the value can be plotted in a graph or not. Text strings can't be plotted, static numerical values makes no sense to plot while changing numerical values makes sense to plot and can therefore be plotted.

Plot Height is the height of the graph to plot in pixels, and it can range from 60 to 800. [This value is now obsolete, setting it does not have any impact on the new charts.]

Is PID Map means that the item in question is used to map which other items that are supported by the ECU. E.g. on Mode 0x01, PID 0x00 there is a map for the supported PIDs in range 0x01 to 0x20 where 0x20 is a new map and so on.

Refresh is the refresh frequency of the parameter when doing logging and plotting. Some data is slower in update than other and can therefore be requested at a lower rate. E.g. engine coolant temperature can have the value 1:30 which means that it's only requested once every 30th sample period.

Data

The **Data** table is where the interpretation of the received data is configured. It contains a lot of fields intended to control the behaviour of data interpretation and presentation.

The **# (number)** column is a numeric ID of the sensor, and controls the order of presentation. The sensors can be sorted by any column of choice and the numbering can be revised by clicking on the **Renumber** button.

The **Name** field can be left blank when it's considered redundant. E.g. when the name of the PID is sufficient.

Unit is a list of units that can be selected for presenting the value. This is not used in the calculation, only in presentation.

Address Offset is the position in the payload packet that the data is located at. This shall be entered in hex form.

Byte Count is the number of bytes the raw data consists of.

Start Bit is used when processing bit-coded data, leave blank if the data isn't bit-coded.

End Bit if it's the same as **Start Bit** it's handled as a single bit, which usually represents a switch On/Off. If it's greater than Start Bit it will mean that the bits in that range are used to form a numeric value that is in the range permitted by the number of bits. Notice that the plotted graphs add an offset for single bit plots to allow you to distinguish between the bits in a byte presented.

Scale Offset and **Scale Factor** are two floating point values that are used to convert the raw data to user-friendly data. E.g. converting the temperature 0x50 to a readable value in Celsius will use the **Scale Offset** of -40 and the **Scale Factor** of 1 as follows:

$$T = (0x50 + [\text{Scale Offset}]) * [\text{Scale Factor}]$$

Or in figures:

$$T = (0x50 + (-40)) * 1$$

This will give you a value of 40 degrees Celsius (Which is about 104 degrees Fahrenheit). To get the value in Fahrenheit instead you will need to use an offset value of -22.22222222 and a scale factor of 1.8.

This of course has the limitation of only permitting linear scaling of the data, so no advanced formulas can be used.

Pres. Min and **Pres Max** are values specifying the range that can be used for plotting data where the min value is the lowest position on the Y axis and the max value is the highest. Any value outside the bounds is considered to be max or min value to avoid runaway plots. Currently these values are only useful when handling the Unit "**bit**".

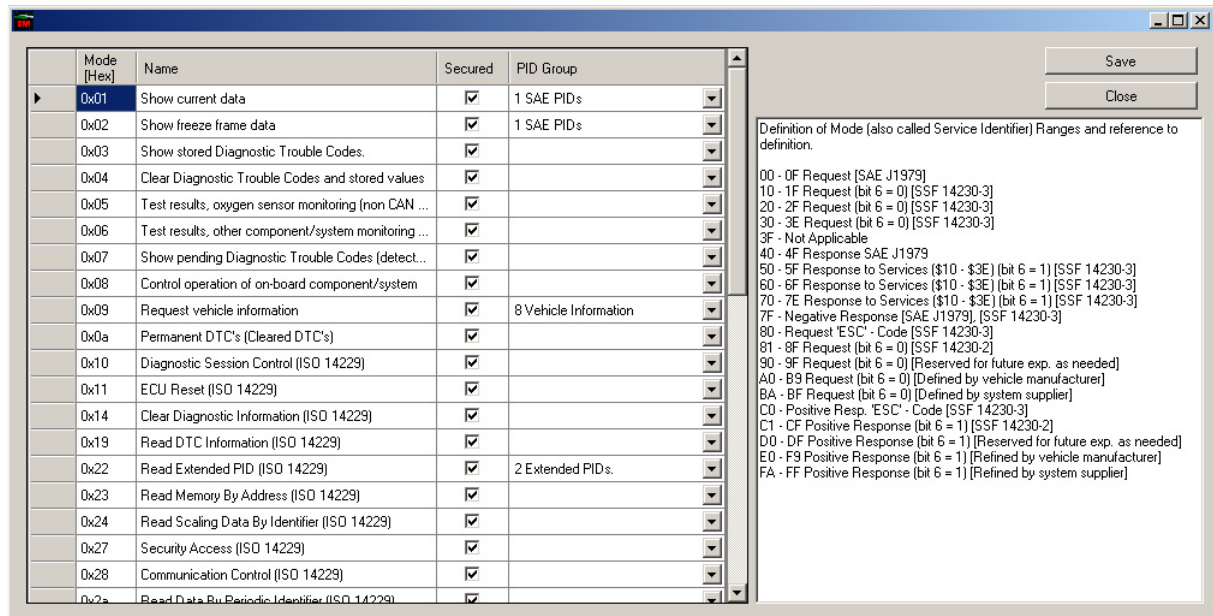
Format is the format to be used when doing a text presentation of the data. Normal alternatives are "0" – no decimals, "0.00" – two decimals etc. The string is fed right into the string formatter for C#, so you have some freedom to choose other format masks as well. If it's empty the format "0.000" is selected. If an invalid format is encountered the default format is used and a "₁" is added after the value.

Zone fields are used to allow for configuration of colored zones in graphs to indicate when a value is outside recommended range. If the Min and Max value for a zone is identical it's disabled. Recommended is to set the values to zero if they aren't used.

Plot Color is controlling the color of some graphs. In other cases it is only used to control if a sensor shall be plotted or not. Any sensor with the color **None** shall not be plotted.

Modes

The Modes Page is used for the basic modes (also called Service Identifier) supported by the ECU.



Mode [Hex]	Name	Secured	PID Group
0x01	Show current data	<input checked="" type="checkbox"/>	1 SAE PIDs
0x02	Show freeze frame data	<input checked="" type="checkbox"/>	1 SAE PIDs
0x03	Show stored Diagnostic Trouble Codes.	<input checked="" type="checkbox"/>	
0x04	Clear Diagnostic Trouble Codes and stored values	<input checked="" type="checkbox"/>	
0x05	Test results, oxygen sensor monitoring (non CAN ...	<input checked="" type="checkbox"/>	
0x06	Test results, other component/system monitoring ...	<input checked="" type="checkbox"/>	
0x07	Show pending Diagnostic Trouble Codes (detect...	<input checked="" type="checkbox"/>	
0x08	Control operation of on-board component/system	<input checked="" type="checkbox"/>	
0x09	Request vehicle information	<input checked="" type="checkbox"/>	8 Vehicle Information
0x0a	Permanent DTC's (Cleared DTC's)	<input checked="" type="checkbox"/>	
0x10	Diagnostic Session Control (ISO 14229)	<input checked="" type="checkbox"/>	
0x11	ECU Reset (ISO 14229)	<input checked="" type="checkbox"/>	
0x14	Clear Diagnostic Information (ISO 14229)	<input checked="" type="checkbox"/>	
0x19	Read DTC Information (ISO 14229)	<input checked="" type="checkbox"/>	
0x22	Read Extended PID (ISO 14229)	<input checked="" type="checkbox"/>	2 Extended PIDs.
0x23	Read Memory By Address (ISO 14229)	<input checked="" type="checkbox"/>	
0x24	Read Scaling Data By Identifier (ISO 14229)	<input checked="" type="checkbox"/>	
0x27	Security Access (ISO 14229)	<input checked="" type="checkbox"/>	
0x28	Communication Control (ISO 14229)	<input checked="" type="checkbox"/>	
0x2a	Read Data By Periodic Identifier (ISO 14229)	<input checked="" type="checkbox"/>	

Definition of Mode (also called Service Identifier) Ranges and reference to definition.

00 - 0F Request [SAE J1979]
10 - 1F Request (bit 6 = 0) [SSF 14230-3]
20 - 2F Request (bit 6 = 0) [SSF 14230-3]
30 - 3E Request (bit 6 = 0) [SSF 14230-3]
3F - Not Applicable
40 - 4F Response SAE J1979
50 - 5F Response to Services (\$10 - \$3E) (bit 6 = 1) [SSF 14230-3]
60 - 6F Response to Services (\$10 - \$3E) (bit 6 = 1) [SSF 14230-3]
70 - 7E Response to Services (\$10 - \$3E) (bit 6 = 1) [SSF 14230-3]
7F - Negative Response [SAE J1979], [SSF 14230-3]
80 - Request 'ESC' - Code [SSF 14230-3]
81 - 8F Request (bit 6 = 0) [SSF 14230-2]
90 - 9F Request (bit 6 = 0) [Reserved for future exp. as needed]
A0 - B9 Request (bit 6 = 0) [Defined by vehicle manufacturer]
BA - BF Request (bit 6 = 0) [Defined by system supplier]
C0 - Positive Resp. 'ESC' - Code [SSF 14230-3]
C1 - CF Positive Response (bit 6 = 1) [SSF 14230-2]
D0 - DF Positive Response (bit 6 = 1) [Reserved for future exp. as needed]
E0 - F9 Positive Response (bit 6 = 1) [Refined by vehicle manufacturer]
FA - FF Positive Response (bit 6 = 1) [Refined by system supplier]

The **Mode** column is sent to the ECU in combination with the **PID** value defined above to get or set data in an ECU. The data is used when interpreting responses from the ECU, and in those cases the returned data has 0x40 added to the mode to indicate that it's an answer. There is no need to declare those added values since the application takes care of the 0x40 adding.

Secured means that the record is protected against accidental deletion because deleting the record can cause problems in the application.

The **PID Group** column is for informative purposes and is also used when parsing responses from ECU.

Vehicles

The Vehicles Page is where you as a user can define a vehicle configuration for a specific vehicle. It is possible to copy an existing vehicle and create a new definition that can be changed to suit your needs.

Name	Brand	Model	Address Bits	Secured
Generic 11-bit			11	<input type="checkbox"/>
Generic 29-bit			29	<input type="checkbox"/>
ISO9141			11	<input type="checkbox"/>
Subaru CAN-Bus	Subaru		11	<input type="checkbox"/>
Subaru ISO9141	Subaru		11	<input type="checkbox"/>
Test			29	<input type="checkbox"/>

Vehicle Table

In this table the **Address Bits** field is important, since it is used to select between the 11-bit addressing mode and the 29 bit addressing mode of ISO15765. It also controls the functionality of the application in some cases.

If your vehicle isn't represented you can start with doing a copy of an existing vehicle that is similar.

General Tab

The **Protocol** is where you select the communication protocol used on the OBD-II connector. All newer vehicles (2008 and later on US market and most vehicles 2008 and later on other markets) supports ISO15765 and CAN while older are using a lot of different protocols.

Speed is one of the speeds defined above. Take care to select a speed that is supported by the protocol you selected.

Tester Addr is the address of the application in some configurations. E.g. 29-bit addressing uses this, 11-bit does not. The value is usually 0xF1 or 0xF0, but some vehicles uses other values.

Add Checksum is for older protocols that needs checksum on the communicated data. Not applicable for ISO15765.

Additional OBD codes file This is the name of the file containing vendor-specific OBD codes in the data directory. Notice that the vendor specific file is always combined with the general set of OBD codes provided with the application. Vendor specific definitions are the primary alternative if the same code is defined in both data sets.

Capabilities Indicates special capability support to be enabled for the vehicle. Currently only SSM (Subaru Select Monitor) is supported which enables some limited extra functionality.

ECU and PID Groups Tab

This tab contains two lists, one of ECU:s and their addresses and the other of the supported PID groups for the vehicle.

Notice that the address format for the ECU:s depends on the number of address bits and protocol. For ISO15765 11-bit only permits the range 0x00 to 0x07 while 29-bit permits 0x00 to 0xFF.

The PID group table is edited by double-clicking on a row to get a pop-up where the data is configured.

Addresses Tab

On this tab the sending and receiving addresses are configured. If you have defined ECU:s in the previous tab you shall only define one broadcast and one fixed address in the Tx table and one address in the Rx table. Values depends on number of bits and protocol.

	Broadcast	Tx	Rx
ISO15765 11-bit 8 addresses	0x07df	0x07e0 to 0x07e7	0x07e8 to 0x07ef
ISO15765 29-bit 256 addresses	0x18db3300	0x18da0000 to 0x18daff00 mask 0xfffff00	0x18da0000 to 0x18da00ff mask 0xffff00ff

Flags and Parameters Tab

On this tab the specific connection and message flags can be configured, as well as additional IOCTL parameters to be applied at connection.

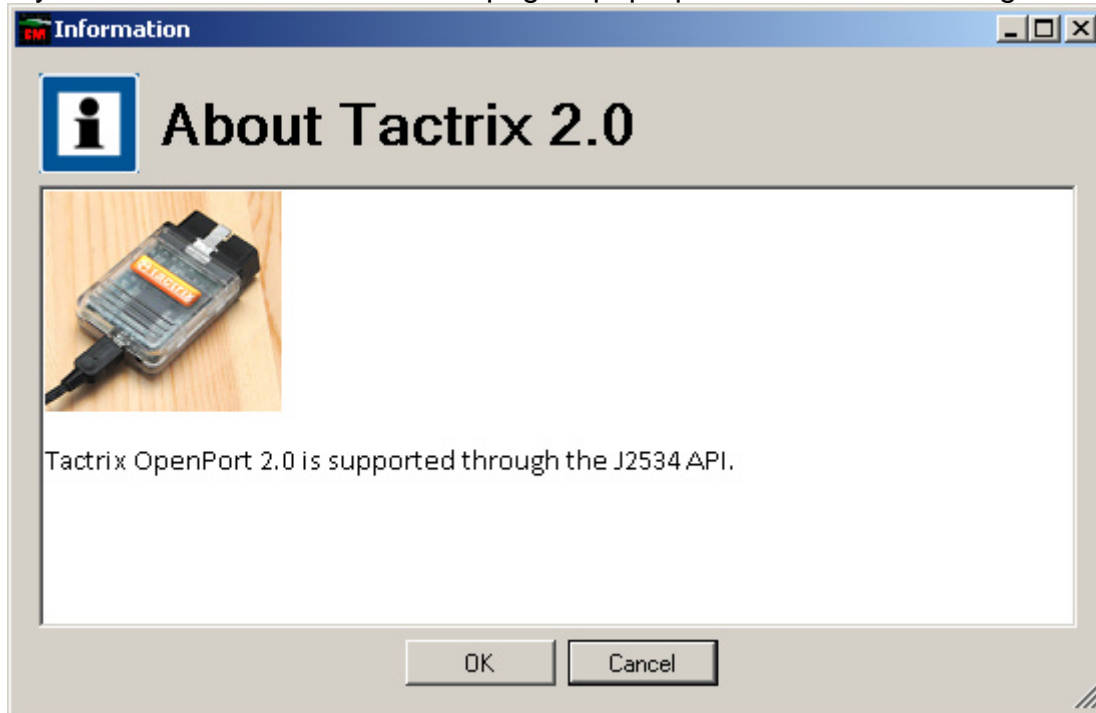
The IOCTL parameter list varies depending on which protocol that is selected.

For a detailed description of the flags and parameters you need to look at the J2534 spec and the API vendor documentation.

Connecting

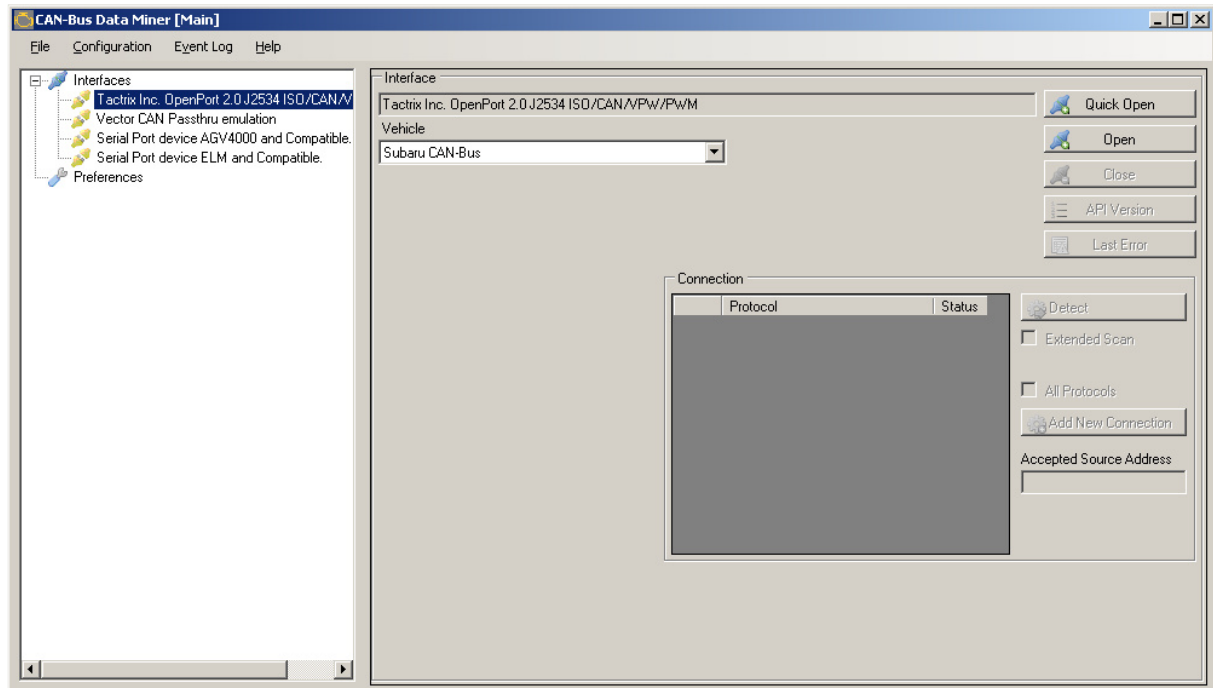
There are two ways to connect to a device, either by selecting the device in the tree to the left or by clicking on the device in the first page.

If you click on a device in the first page a pop-up similar to the following:



If the OK button is active it can be clicked and the device shall be selected in the tree to the left. The item in the tree can also be selected manually.

Interface



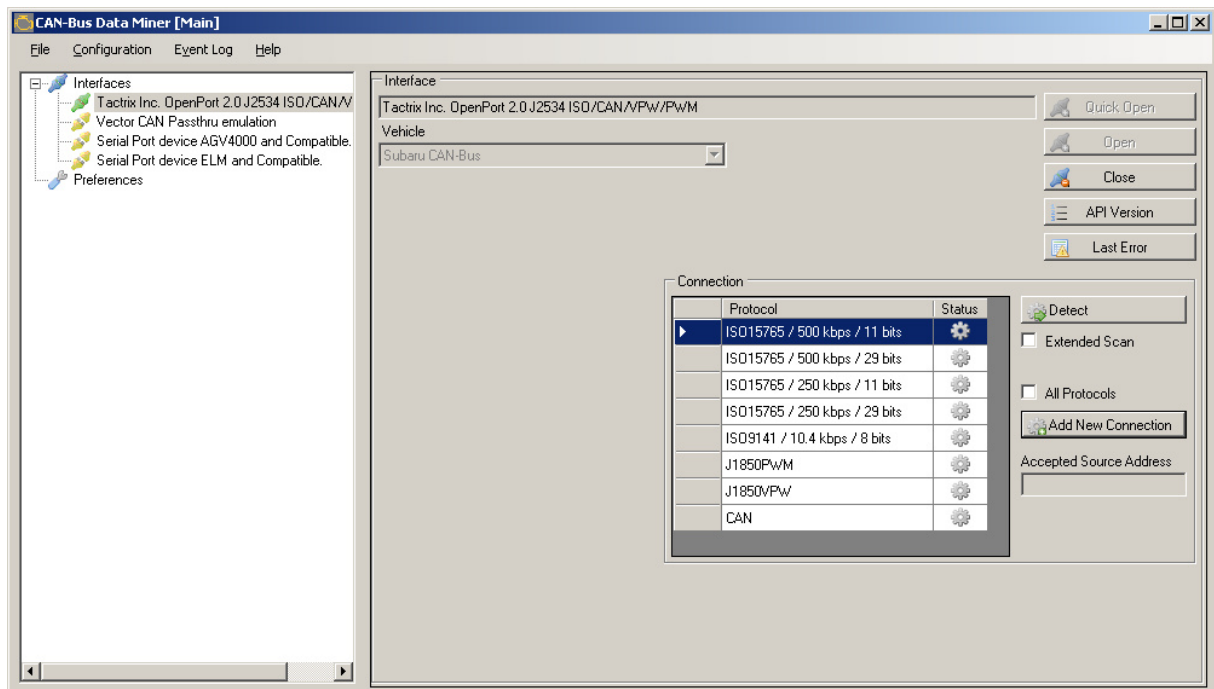
When selecting a device in the tree the page above will be displayed. The content varies depending on the selected device. E.g. serial devices will offer additional fields where the user can select COM port and COM port parameters.

If you have configured your vehicle correctly you may click on the **Quick Open** which is the fast and easy way to get to the OBD data page. Notice that the Quick Open function is pretty stupid and is not able to resolve encountered problems very well.

By using the **Open** button you will instead be able to do a step by step connection to the device and vehicle. This is useful in case you want to try alternatives like using the CAN protocol instead of ISO15765.

Since some devices (and vehicles) can handle multiple protocols simultaneously the user is offered the ability to select protocol for the connection. The default protocol depends on which vehicle that is selected.

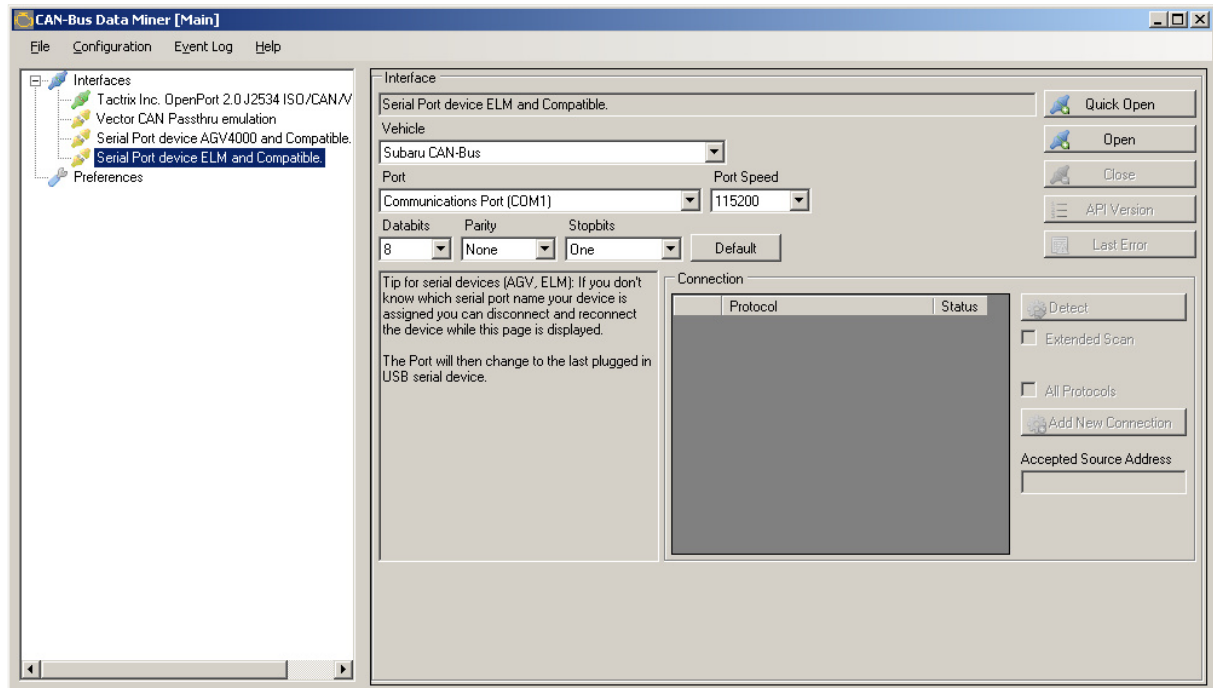
All known protocols will be selectable by checking the the checkbox “All Protocols”, but be aware that this also means that protocols not documented as being supported by the application, device or vehicle will be provided. This is primarily for testing and shall normally be left unchecked.



Select the protocol to use and click “Add New Connection”. This shall bring up a new page where the protocol parameters can be configured.

Smart Serial Interface

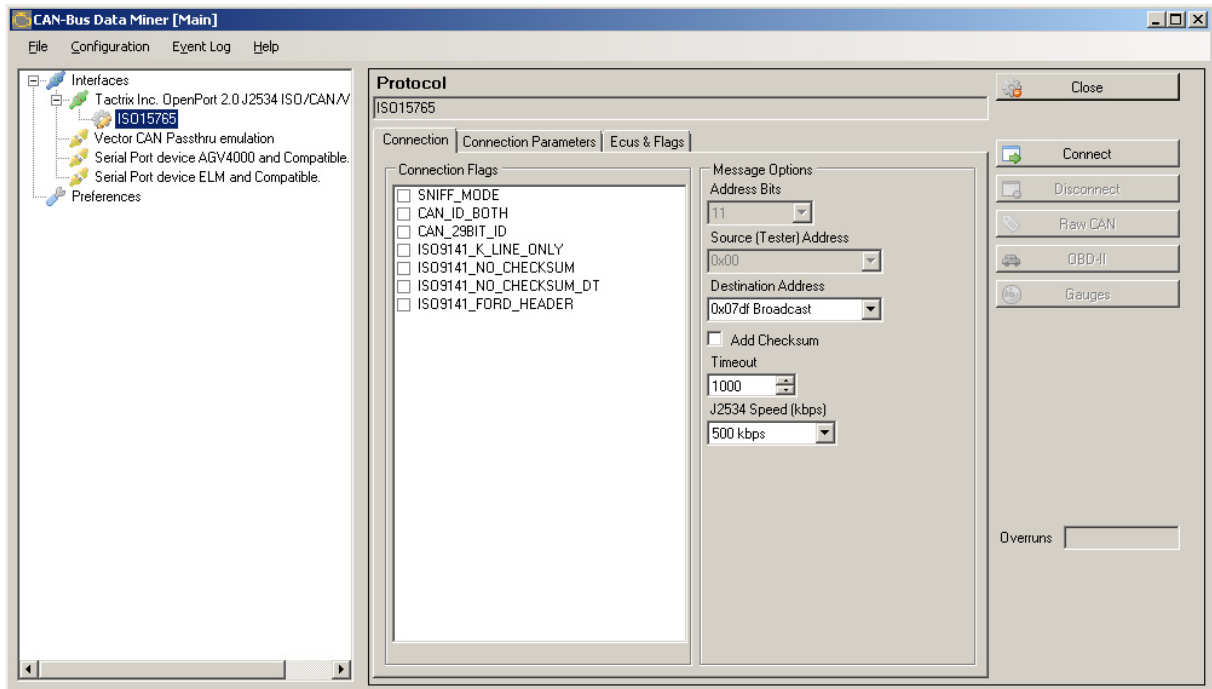
When using a smart serial interface like the AGV4000 and ELM327 there will be a few more interface parameters to consider in order to inform the application of which port the device is connected to. Communication speed, parity, data bits and stop bits can also be configured here if necessary.



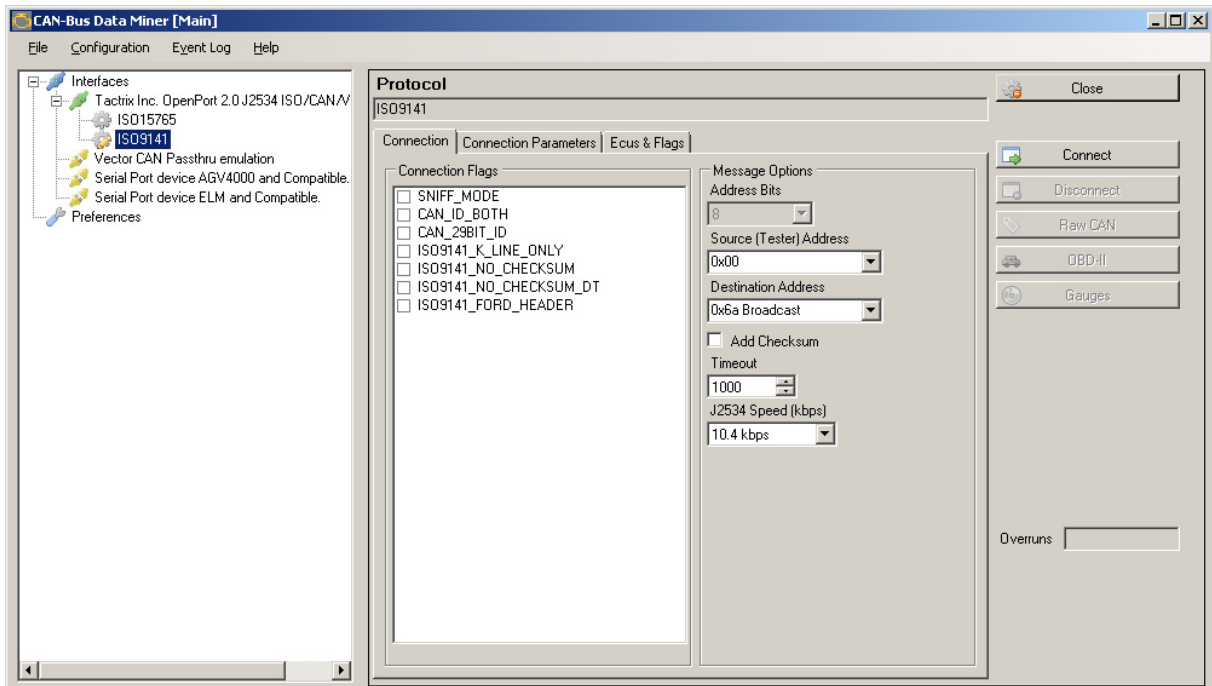
If you don't know which serial port your device was assigned you can disconnect and reconnect it while the page above is displayed. The correct alternative will then be selected in the **Port** drop-down. However you will still need to configure the speed and the other parameters if they are different from the default for the device.

Protocol

The Protocol page offers the ability to set protocol specific parameters before connecting with the vehicle. These parameters can be specified in the vehicle configuration. Which parameters that are available for configuration depends on which device and protocol that is selected.

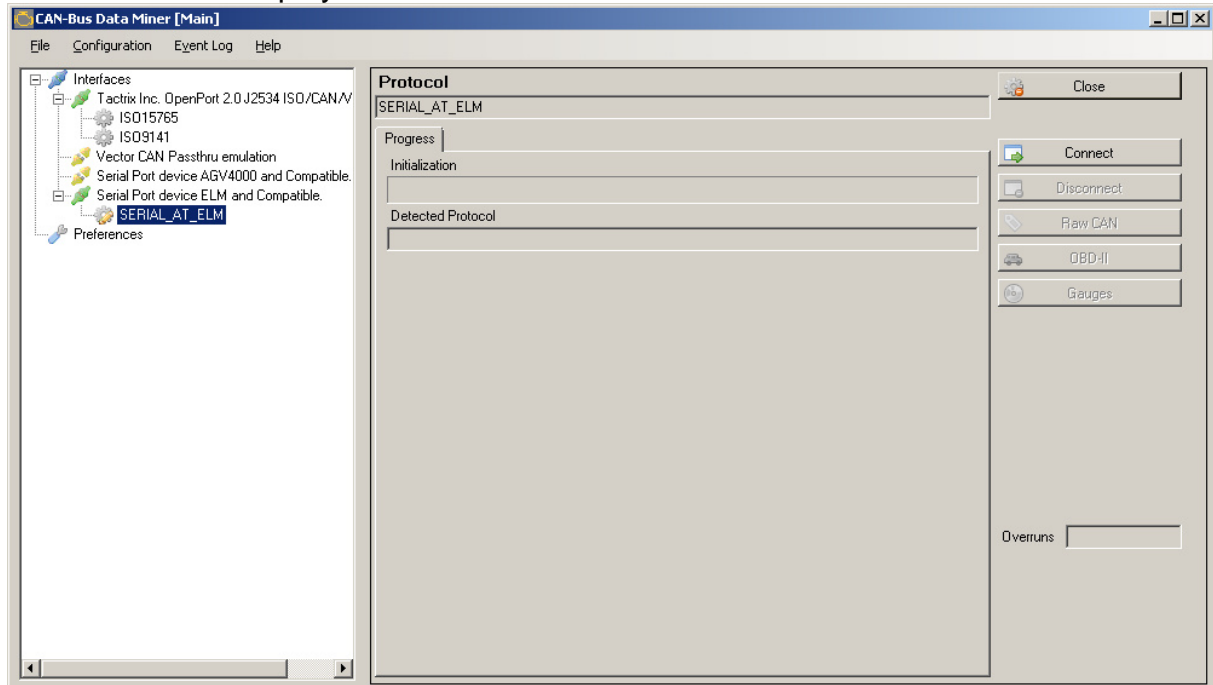


Notice that J2534 devices may support multiple protocols at the same time, so you can set up both ISO15765 and ISO9141 at the same time using the same device. This will of course require that the device and the vehicle you connect to supports it.



When connecting using a serial port device (AGV or ELM) there are no options to configure and the adapter takes care of all necessary low level data.

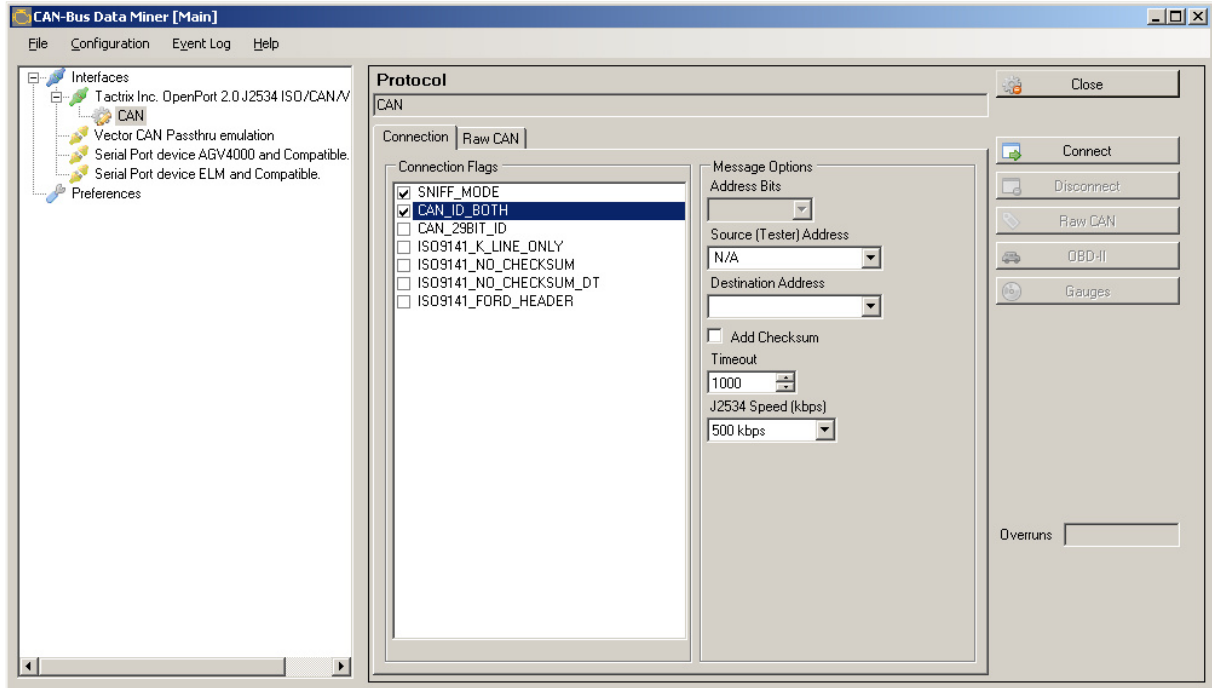
Instead a progress bar and an information field about which protocol that was detected will be displayed:



The progress bar is stepping up as the initialization commands are stepped through to the adapter and finally the field for the detected protocol shall be filled in with the protocol that the adapter did discover when communicating with the vehicle.

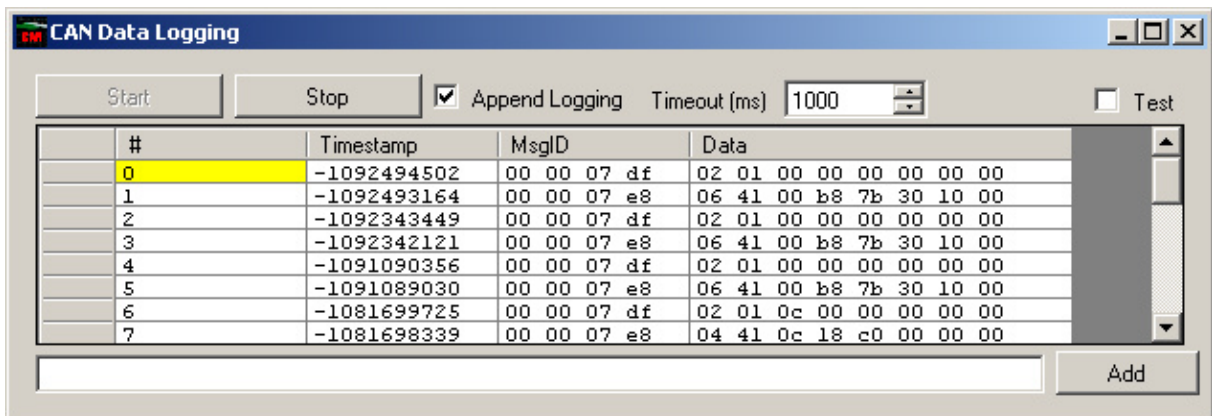
CAN Logging

The CAN logging can currently only be done with the Tactrix adapter, and it requires you to set the connection protocol to **CAN** and the connection flags **SNIFF_MODE** and **CAN_ID_BOTH** and then connect. The data that is logged is raw CAN data and you will need a separate database for the vehicle in question to be able to interpret it.



When clicking on the **Raw CAN** button you will get a new window that is used for CAN data logging and control of the logging.

Pressing on the **Start** button will start the listening for CAN messages and they will be presented in the window as they come in and are updated. By checking the **Append Logging** checkbox the data in the log window is appended otherwise there is a lookup performed and the data with the same MsgID is replaced with the latest. For large volumes it is a good idea to log to file.

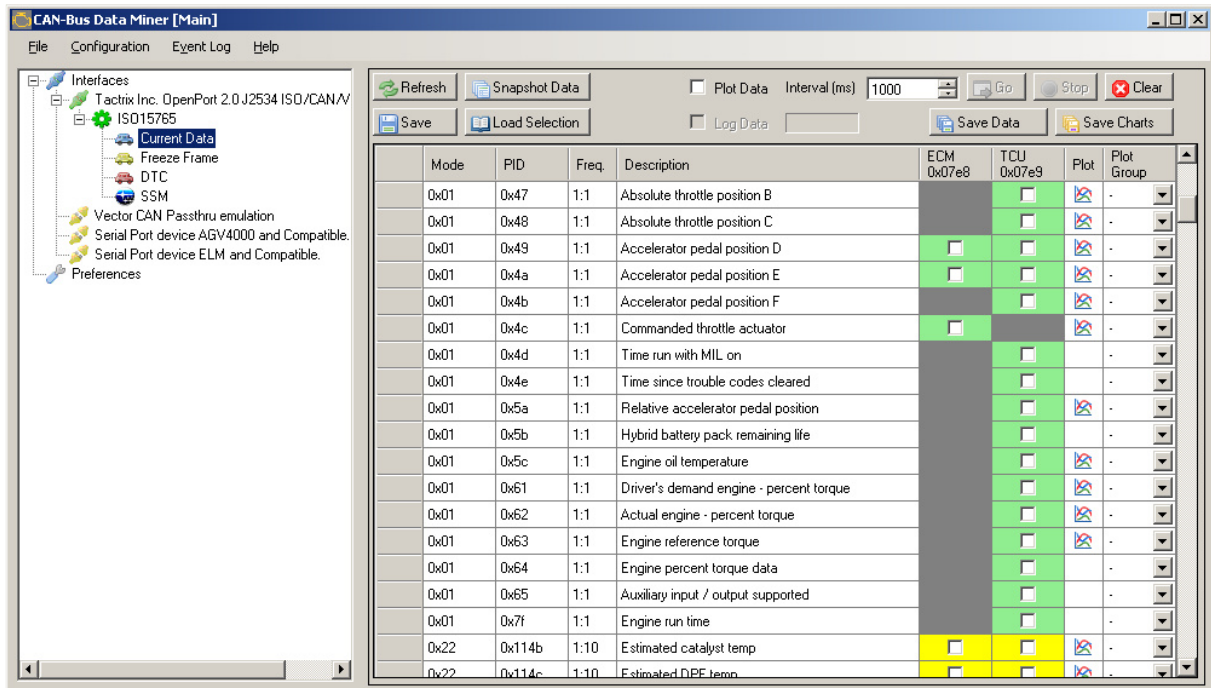


This is the RAW CAN packets that are logged, which is useful for some but the data is often very specific for a brand and a vehicle model.

If you are lucky and have access to Vector Canalyzer you can open the log file in that application for further analysis and processing.

At the bottom of the window you have a text field and an “Add” button which allows you to add comments to the log file that can be used for tracking events, e.g. when switching on the wipers.

OBD-II

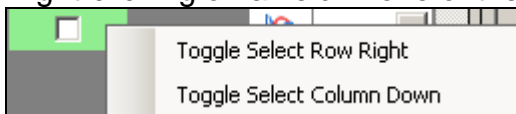


This window is actually a bit more than OBD-II, but OBD-II is the base functionality that is used. Some brand specific items are added here too – like part of SSM (Subaru Select Monitor).

Due to the amount and type of information it is split into several pages.

The checkbox columns decide which ECU to communicate with and which data to request. Green background means that the ECU has confirmed support for the item, dark grey means that the item is unavailable while yellow means that the ECU **MAY** support the item.

Right-clicking on a field in one of the ECU columns will bring up a menu:



In this menu you can select all checkboxes from the current box to the last on the row or column. Notice that when selecting column only those items that have the same **Plot** state as the current cell will be selected.

Current Data

On this page there are several buttons, a table and a few other items.

Buttons:

- **Refresh** – Requests data from the vehicle about supported fields. Also clears all selected items.
- **Snapshot data** – Requests one shot of data values from the vehicle using the data selected by the checkboxes in the table. If the **Plot Data** checkbox is checked the data ends up in charts otherwise in text form.
- **Save** – Save the current selection configuration. Useful when you have a specific configuration that you want to re-use or share with friends.
- **Load Selection** – Load a saved configuration from file.
- **Go** – Used to start logging or plotting using data requested by the interval given by the **Interval (ms)** field. The button is only activated if Plot Data and/or Log Data checkboxes are checked.
- **Stop** – Stops request of logging/plotting data.
- **Clear** – Clear the current set of sub panels to the data panel.
- **Save Data** – Save the data in each sub panel to a directory selected by the user. The user is prompted to choose between saving data in one single file with joined data or multiple files with one file for each PID.
- **Save Charts** – Save all charts in sub-panels as PNG images of size 1024x768.

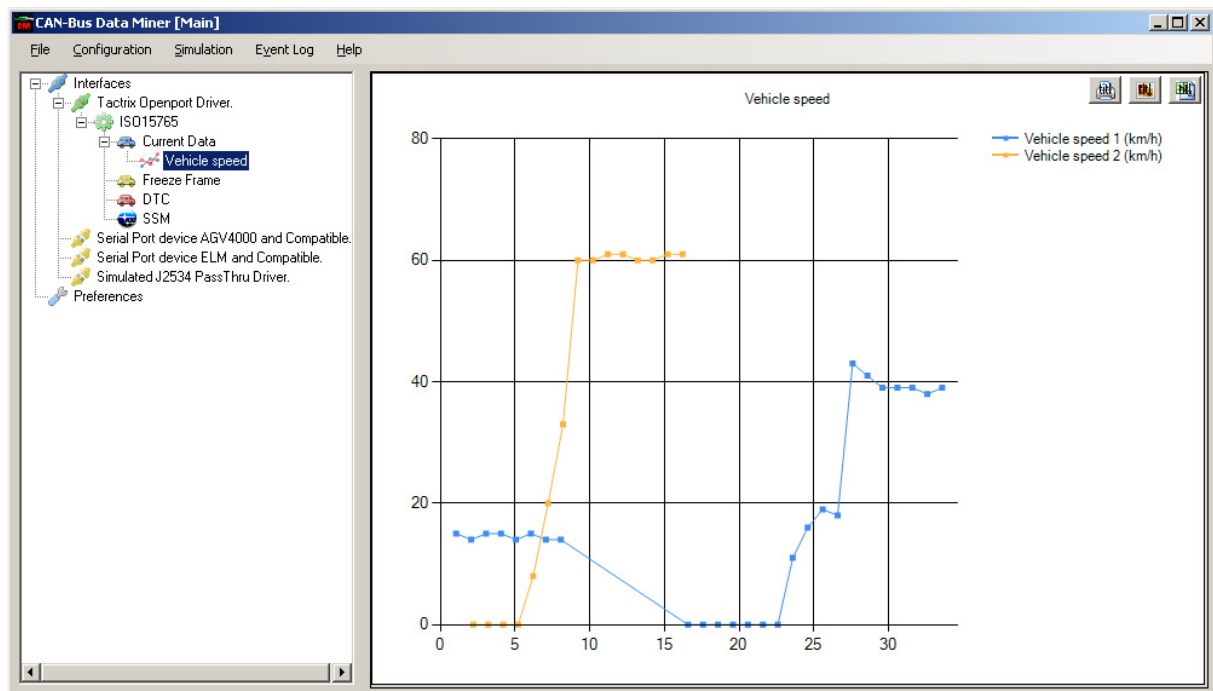
Checkboxes:

- **Plot Data** – Checked if data shall be plotted to charts.
- **Log Data** – Checked if data shall be logged to file. This is disabled if no log file is opened.

Data Table Columns:

- **Mode** – The mode (service ID) value for the item.
- **PID** – PID, Address or other identifier for the item.
- **Freq** – Sample frequency, provided for information.
- **Description** – Text describing the PID.
- **<ECU Column(s)>** - One or more columns presenting ECUs supported and which PIDs they support. This can be one or more columns.
- **Plot** – Has an icon indicating if the data can be plotted on a chart. (Data that varies over time has this)
- **Plot Group** – Used when two or more values shall appear in the same chart. Use the same number for each value that shall appear in the same chart. Up to nine groups are supported.

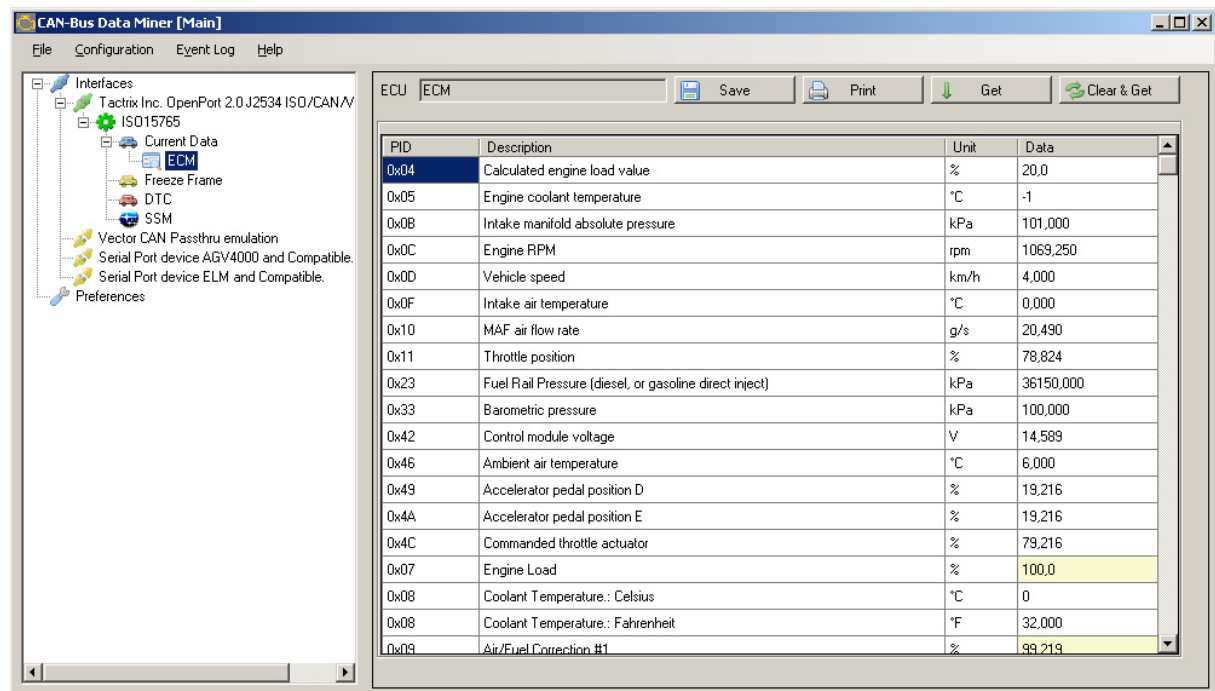
Chart data



Above is a simple chart. The chart offers three buttons, Print, Save image and Save data. The buttons are hidden while the chart is updated and displayed when the logging of data is stopped.

It is possible to stop the plotting and re-start it. A question will be asked at restart if it shall continue on the same series or start a new series. The selection will impact all charts, there is no way to select different action for each chart plotted.

Snapshot Data



The screenshot shows the 'CAN-Bus Data Miner [Main]' window. On the left is a tree view of interfaces, including 'Tactrix Inc. OpenPort 2.0 J2534 ISO/CAN/V', 'ISO15765', 'Current Data', 'ECM', 'Freeze Frame', 'DTC', 'SSM', and 'Vector CAN Passthru emulation'. The main area displays a table of PID data for the selected 'ECM' ECU. The table has columns for PID, Description, Unit, and Data. The 'Data' column contains values such as 20.0, -1, 101,000, 1069,250, 4,000, 0,000, 20,490, 78,824, 36150,000, 100,000, 14,589, 6,000, 19,216, 19,216, 79,216, 100,0, 0, 32,000, and 99,219. The 'Data' field for PID 0x07 is highlighted in light yellow.

PID	Description	Unit	Data
0x04	Calculated engine load value	%	20,0
0x05	Engine coolant temperature	°C	-1
0x0B	Intake manifold absolute pressure	kPa	101,000
0x0C	Engine RPM	rpm	1069,250
0x0D	Vehicle speed	km/h	4,000
0x0F	Intake air temperature	°C	0,000
0x10	MAF air flow rate	g/s	20,490
0x11	Throttle position	%	78,824
0x23	Fuel Rail Pressure (diesel, or gasoline direct inject)	kPa	36150,000
0x33	Barometric pressure	kPa	100,000
0x42	Control module voltage	V	14,589
0x46	Ambient air temperature	°C	6,000
0x49	Accelerator pedal position D	%	19,216
0x4A	Accelerator pedal position E	%	19,216
0x4C	Commanded throttle actuator	%	79,216
0x07	Engine Load	%	100,0
0x08	Coolant Temperature.: Celsius	°C	0
0x08	Coolant Temperature.: Fahrenheit	°F	32,000
0x09	Air/Fuel Correction #1	%	99,219

Snapshot data is the data that is the result of a single data request. The **Get** button appends data to the list while the **Clear & Get** button clears the table and refreshes it with latest data.

Data fields with light yellow color are fields that are potentially invalid (the data was all ones from the vehicle indicating a raw value of 255, 65535 etc.).

The **Save** button saves the data to a CSV file that can be opened in Excel and other programs supporting that format.

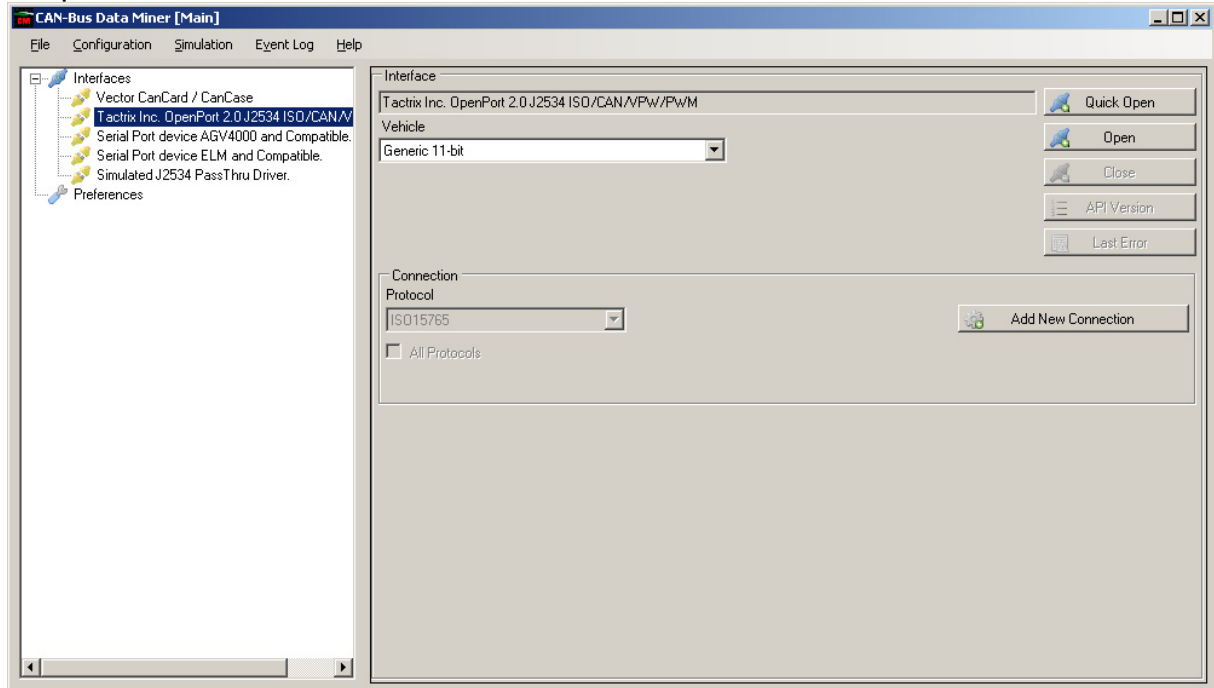
The **Print** button will print the data to a printer of your choice. It is designed to work with standard paper sizes like **Letter** or **A4**.

Howtos

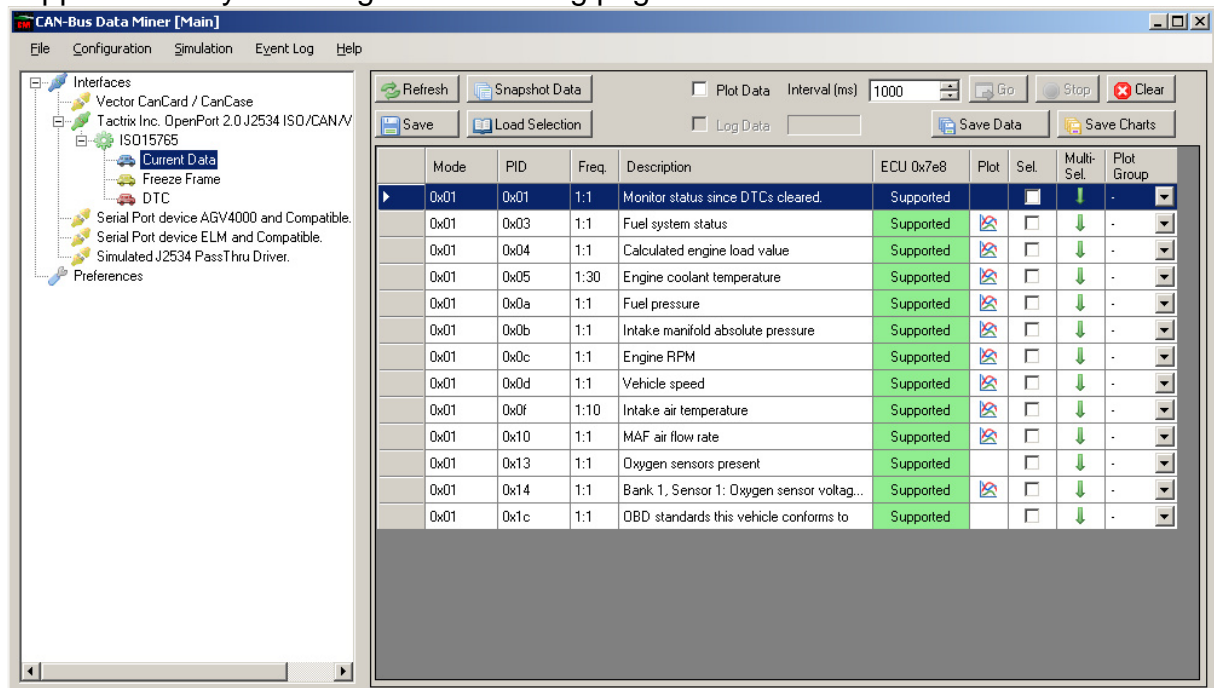
Here a few common tasks are described. More will be added from time to time.

Data Log

Connect the adapter to the vehicle and computer, start the application. Select the adapter and then the vehicle model.

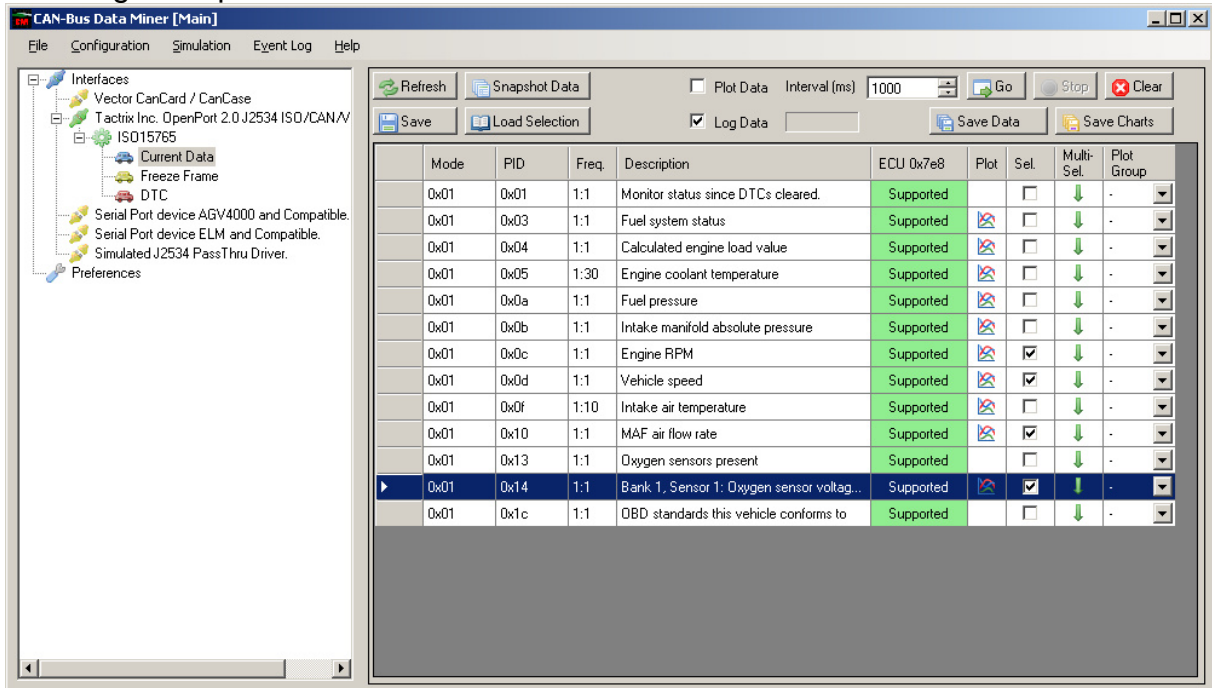


Click on “Quick Open” if you know that the combination of vehicle and protocol is supported and you shall get the following page:



Under the “File” menu select “Open Measurement Data Log File...” and select a suitable location and name for the file. The data shall be written in Excel CSV format (actual format differs depending on the locale setting of your computer). US format is using “,” as a field separator and “.” as a decimal separator while some European countries uses “;” as a field separator and “,” as a decimal separator.

Check the “Log Data” checkbox and the items you want to log to file as in the following example:



Set the “Interval (ms)” value to the interval between each log event that you want to have. Then click on the “Go” button to start the logging.

To indicate that the application is working there is a progress bar that moves in the field below the “Interval (ms)” label.

Click the “Stop” button to stop logging. Don’t forget to close the data log file before trying to read it with another program.

No threshold value exists to trig start and stop of logging.

Supported Hardware Reference

Since this software supports several hardware devices a reference to the devices is in order.

Device	Description
Tactrix 2.0	An OBD adapter provided by Tactrix Inc. http://www.tactrix.com/
UWA 020	The Volvo Trucks standard adapter. http://www.volvotrucks.com/
DiCE	The Volvo Cars standard adapter. http://www.volvocars.com/
CanCase XL	A device for CAN bus traffic logging and analysis. https://www.vector.com/vi_index_en.html
ElmScan 5	One device using the ELM327 (or compatible) chip: http://www.scantool.net/elmscan5-compact.html
ObdLink SX	One device using the ELM327 (or compatible) chip: http://www.scantool.net/scan-tools/pc-based/obdlink-sx.html
AGV4000	A device with a chip that's similar to the ELM327 but not entirely compatible. Notice that the AGV4000 and AGV4000B are two different devices that looks almost identical, but the AGV4000 has some bugs that the AGV4000B corrects. AGV4000 is supported, but not recommended due to the bugs. http://agv4000.de/
AGV4000B	Similar to the ELM device but not entirely compatible, does not have the bugs that the AGV4000 has. http://agv4000.de/
Tactrix 1.3	An older cable from Tactrix inc which is limited in functionality and requires the PC to implement the protocol. Will only work with ISO9141 and ISO14230 when it's supported. http://www.tactrix.com/
Vag-COM KKL	A cable similar to the Tactrix 1.3 which requires the PC to implement the protocol. http://www.scantool-direct.co.uk/vag-com-kk-usb--diagnostic-interface-49-p.asp


For further information about ELM chips see; <http://elmelectronics.com/obdic.html>

There is a chip STN1110 which claims to be compatible with the ELM chip but have better performance. No tests have been performed with that chip, and it may work or it may not work. See <http://www.obdsol.com/stn1110/> for further info.

Other J2534 devices shall work if they support the 04.04 version of the API. The application searches for the devices in the registry, so don't be surprised if your odd device is listed.

Unsupported Devices

Since some devices are problematic they are listed here as “Unsupported” devices.

Device	Description
ELM327 Ver 1.5a	<p>A Chinese clone, the one in the picture doesn't even work.</p>  <p>This is a clone of an old 1.2 ELM device. If you have one and want to try it you can do so since it's not blocked in the software, but don't expect it to work.</p>