New Eagle

CONTROL SYSTEM SOLUTIONS

New Eagle Data Logging Platform

Full Platform Review

Last Updated:
5/01/2017

 www.neweagle.net PH: 734.929.4557

Contents

1. Introduction

The New Eagle CAN-Bus Data Logging Platform provides a set of tools that allow the user access to live data produced by any CAN system. The tools can be used for a range of tasks from system development to diagnosing performance issues. Overall the tools aim to reduce the users' time and effort, while delivering a robust system. The platform provides a range of options that enable the user to select the most appropriate method for the task at hand.

New Eagle Data Logging Platform Workflow

Hardware Selection
The selection of data logging hardware will differ based on an individual project's requirements. New Eagle offers standard options such as displays, controllers, and a telematics option; all detailed in section 2.

Logging Data
Once the appropriate hardware is selected it can be easily used to log the CAN-Bus data.

Data Conversion
When the user has collected an appropriate amount of data, Raptor™-CAN will be used to convert raw CAN data to a convenient CSV file format that includes engineering units. This is done by utilizing the associated DBC file. More information about Raptor™-CAN is found in section 4 of this document.

Typically, the user will progress through the steps in an iterative fashion advancing through the CAN system's functionality until the task is complete. See the application example in section 3 to see how all these steps are executed, as well as a comparison of the data logging hardware.

2. Hardware Options

The New Eagle CAN-Bus Data Logging Platform is available in many different hardware options. In addition to a simple PC and Kvaser setup, New Eagle offers three data logging tools to meet a variety of needs for CAN data collection.

VeeCAN 320 Data Logger

Features

- 3.5” full color display
- Displays real-time raw CAN traffic
- Compatible with Raptor™-CAN for converting raw CAN into engineering units
- 2 CAN channels
- Primary connector for logging and secondary connector for extended functionality, including analog inputs, digital outputs, serial transmit, and tachometer input
- 1ms logging capability
- Individual log files up 128mb
- USB drives over 32GB require FAT32 formatting
- See Datasheet for full technical specifications

VeeCAN 320 Lite Data Logger

Features

- 3.5” full color display
- Displays real-time raw CAN traffic
- Compatible with Raptor™-CAN for converting raw CAN into engineering units
- 1ms logging capability
- Individual log files up 128mb
- USB drives over 32GB require FAT32 formatting
- See Datasheet for full technical specifications

Raptor™ Telematics

Features

- Allows for remote calibration, remote reflashing of ECU's, and fault reporting
- CAN data-aggregation and analytic processing to real time vehicle monitoring over cell network
- Data logged by telematics unit is submitted to fleet web server
- Web portal interface allows users to track vehicle locations and operational parameters in real time, alerts for damaged equipment, multiple vehicle management, and push updates to vehicles in field
- Additional features:
    - 3G GSM cellular data
    - Stolen vehicle detection
    - Fuel consumption
    - Vehicle fault codes
    - Vehicle position (GPS)
- 5 second logging capability
- See Datasheet for full technical specifications

Supported Baud Rates

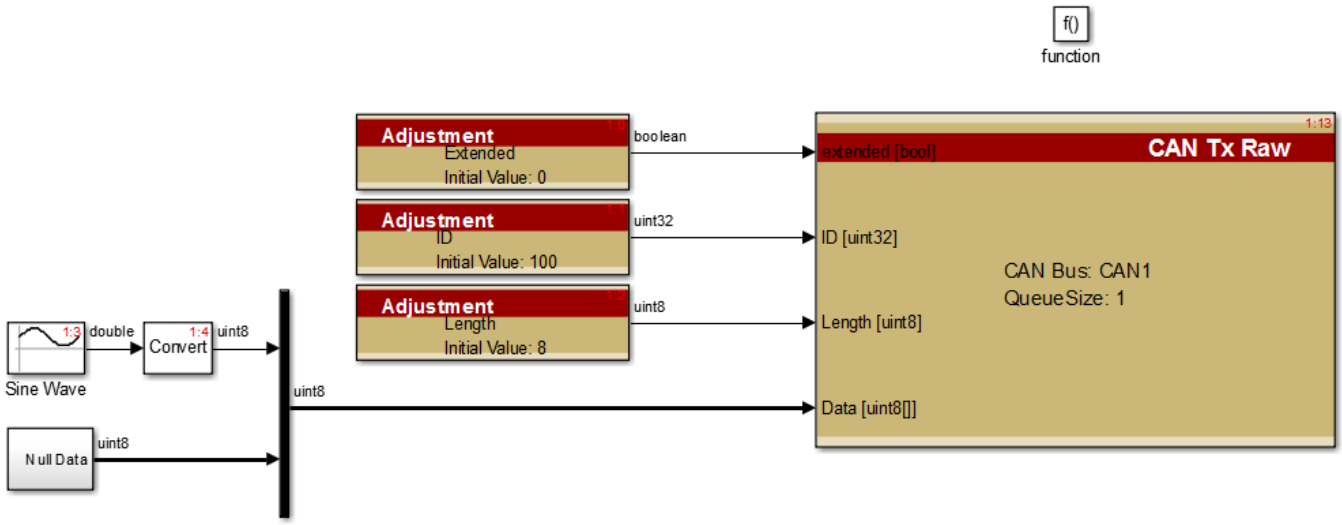
Hardware	Baud Rates			
	125k	250k	500k	1000k
VeeCAN 320	Yes	Yes	Yes	Yes
VeeCAN 320 Lite	Yes	Yes	Yes	Yes
Raptor™ Telematics	No	Yes	Yes	No

Hardware supported baud rate table

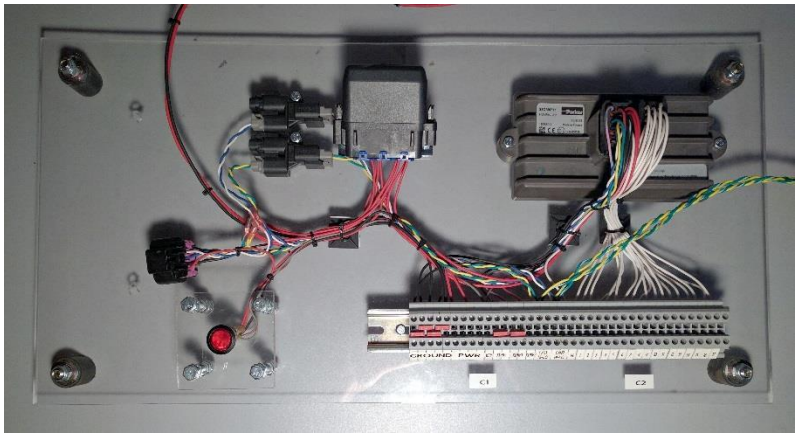
3. Hardware Comparisons

Application Example

This section shows an example project using New Eagle's Data Logging Platform. Using Raptor™-Dev, we are able to quickly create a simple model that outputs a sine wave over CAN from a Raptor™ Controller. The model, as shown below, consists of a few data blocks and a CAN transmit block all from the Raptor™-Dev library.



The model was built for a CM0711 Raptor™ Module and outputs the sine wave onto the CAN bus, ready for our data logging units to pick up the messages. The image to the right is the set up used for the CM0711.



Once the sine wave outputs data over the CAN bus it is time to log the data. New Eagle's hardware options allow the user to log in many different ways, from instant logging to slower, low overhead monitoring. Below details how all of the hardware can be used to log data from this application.

All of the data logging hardware logs in raw CAN form *except* for New Eagle's Raptor™ Telematics. Using the Telematics Web Portal a .CSV can be downloaded which outputs all of the data from a user specified time range that contains engineering values. All other hardware options require post processing by Raptor™-CAN. Load the raw CAN files into the *CAN Logging Tool* section of Raptor™-CAN to convert them to .rCAN files. All .rCAN files can then be inputted into the *Analyze Logs* function of the tool to output a .CSV file.

To be converted to a .CSV file successfully a .DBC file will be required. A .DBC file describes data coming from the CAN bus, containing names, data types, offsets, gains, etc. Input the desired .rCAN and .DBC files into the *Analyze Logs* section of Raptor™-CAN to generate a .CSV file, this can be opened in any spreadsheet viewer such as Microsoft Excel.

Note: Raptor™-CAN requires a Kvaser USB to CAN product to log data. Kvaser CanKing is a similar tool able to log CAN data to a .txt file. This format is also supported by Raptor™-CAN.

The image to the right is an example of what the user would expect to see in the .CSV file format when view the engineering units in a spreadsheet view.

Using the data logging products the following data was collected from the simple sine wave model that was detailed in the above section. The value oscillates from 0 to 100. The graphs show the difference between fast and slow logging devices. See the next section for more information on capture rates and their applicable uses.

The following data sets were collected live over a 10 second period with the data amounts listed below:

VeeCAN Data Logger: *200 Messages/Second*

Raptor-CAN Data Logging: *200 Messages/Second*

Raptor Telematics: *2 Messages/Second*

	A	B	C
1	Time	Sine Wave	
2	0.006681	89	
3	0.007608	92	
4	0.008608	94	
5	0.009609	96	
6	0.010609	98	
7	0.011609	99	
8	0.012609	99	
9	0.013609	99	
10	0.014609	99	
11	0.01561	98	
12	0.01661	97	
13	0.01761	95	
14	0.01861	93	
15	0.01961	90	
16	0.02061	87	
17	0.02161	83	
18	0.022611	79	
19	0.023611	75	
20	0.024611	71	
21	0.025611	66	
22	0.026611	61	

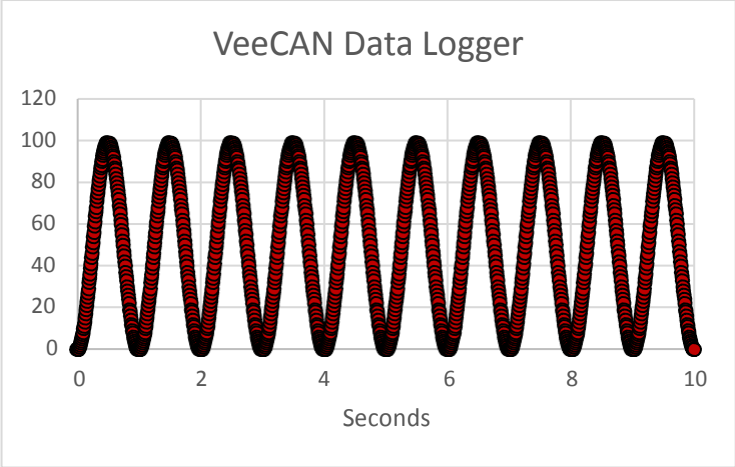
1SEC-2

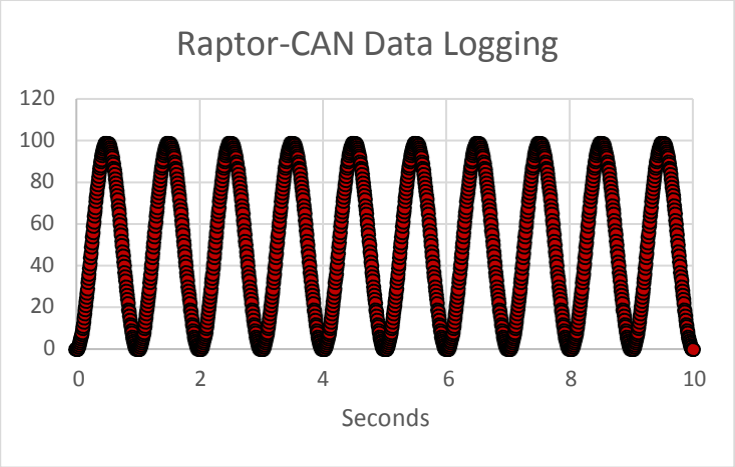
READY

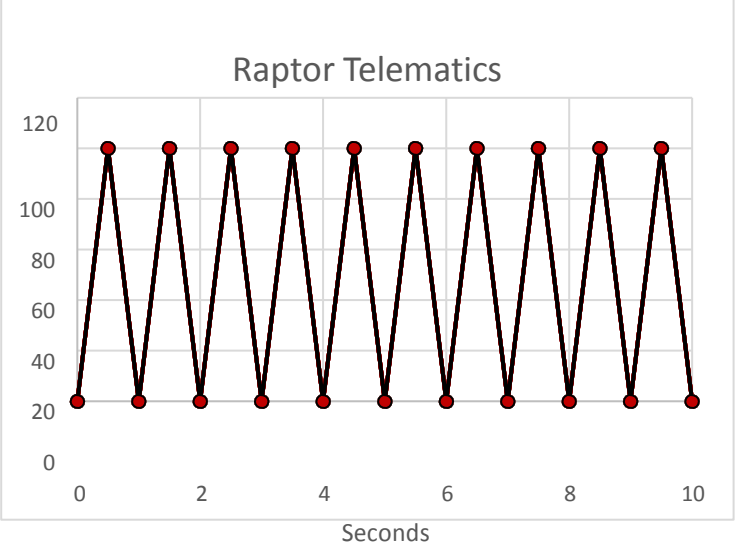
	A	B	C
1	Time	Sine Wave	
2	0.006468	87	
3	0.006487	87	
4	0.006487	87	
5	0.006487	87	
6	0.006487	87	
7	0.006488	87	
8	0.006488	87	
9	0.006488	87	
10	0.006488	87	
11	0.006488	87	
12	0.006488	87	
13	0.006489	87	
14	0.006489	88	
15	0.006489	88	
16	0.006489	88	
17	0.006489	88	
18	0.006489	88	
19	0.00649	88	
20	0.00649	88	
21	0.00649	88	
22	0.00649	88	

5MS-2

READY

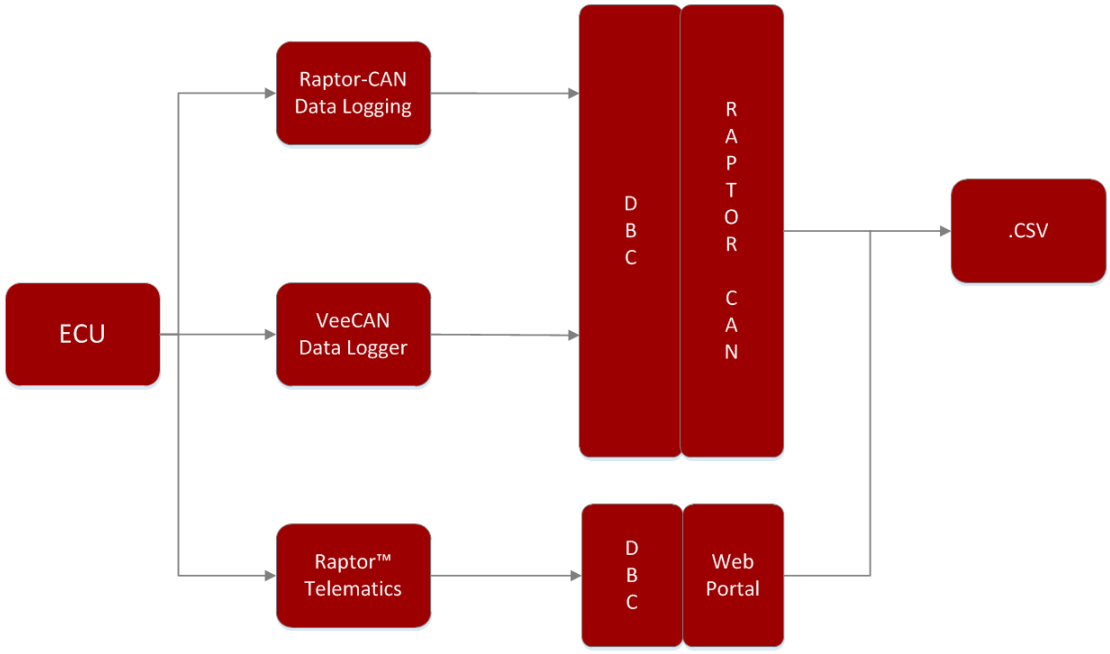






Data Logging Capabilities

New Eagle's hardware data logging options provide many options to record data. The diagram below shows that converting data from a raw CAN file uses a DBC file in combination with Raptor™-CAN's conversion tool. Raptor™-CAN allows any PC to become a data logging device by enabling the user to log CAN data instantly to a file using a Kvaser CAN to USB PC tool. Using the VeeCAN Data Logging units also utilize Raptor™-CAN's conversion tool, all files processed by Raptor™-CAN will be converted into a convenient CSV file format that includes engineering units.



The table below details logging capabilities of the data logging devices. This test was conducted by the New Eagle engineering team and is a useful comparison to help narrow down which device suits your system's needs. The test results include the average of number of messages sent on to the CAN bus and how many of those were recorded by the data logging device. A higher capture rate device may be more useful for systems in a state of development where fine tuning is required, whereas a lower capture rate would be beneficial to have standard signal monitoring for values such as RPM, light status, etc.

Logging Method	Logging Information					
	Messages Sent*	Messages Read	Transmit Rate	Capture Rate	Sample Rate	Signals per Sample
Raptor™ -CAN	1000	1000	5ms	**100%**	0.1ms	Unlimited*
VeeCAN Displays	1000	950	5ms	**95%**	1ms	Unlimited*
Raptor™ Telematics	1000	100	5ms	**10%**	1s	200

Note: Signal samples identify how many signals that can be captured per logging sample. I.e. Raptor™ Telematics can capture 200 messages per second. Due to its sample rate of 1 second.

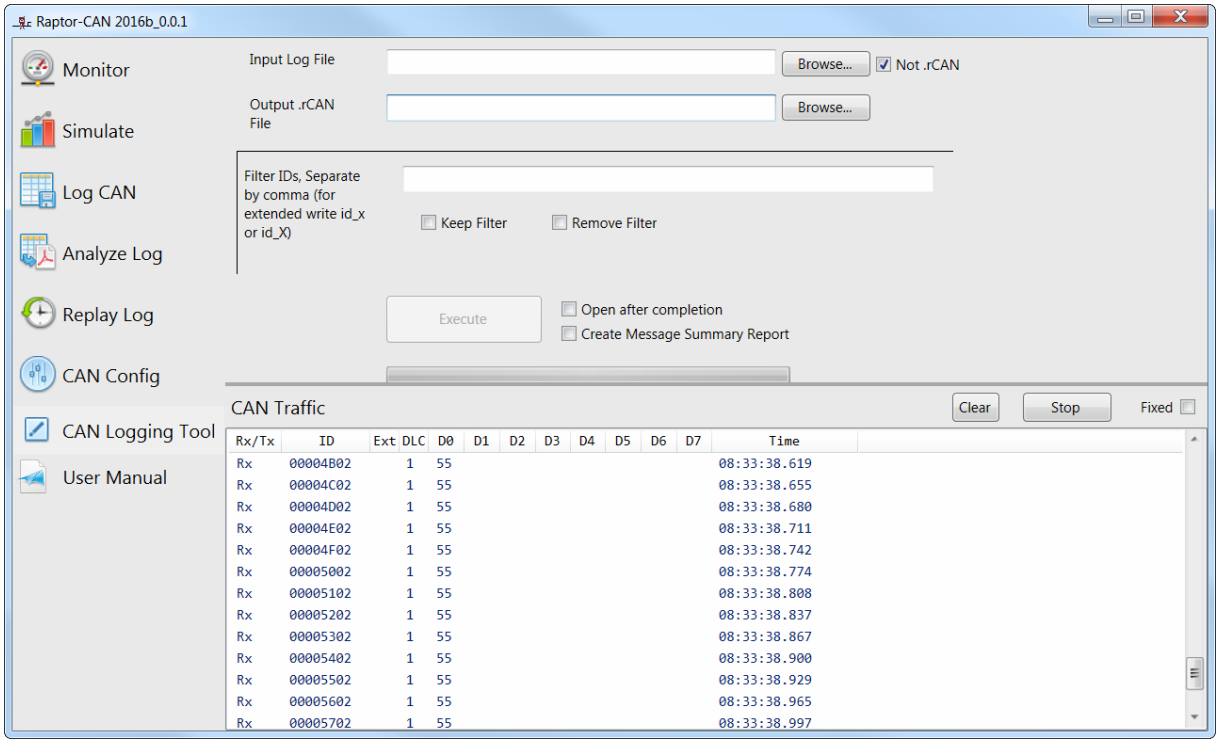
**Raptor™-CAN and VeeCAN units have unlimited signal sample capabilities but may run in to issues at higher bus load.*

4. Raptor™-CAN

CAN Analysis Tool

Raptor™-CAN incorporates simple, intuitive, and effective methods to monitor, simulate, and log CAN data into a user friendly interface. In combination with New Eagle's Data Logging hardware line up, Raptor™-CAN has the ability to process raw CAN data and produce a file complete with readable engineering units from a specified DBC file. This section will showcase how Raptor™-CAN is used with our Data Logging Platform, to see more information on Raptor™-CAN's features visit the New Eagle Wiki.

The first useful tool Raptor™-CAN offers the Data Logging Platform is the CAN Logging Tool. This allows the user to convert a raw CAN file into Raptor™-CAN's own file format .rCAN. The benefit to an .rCAN file is that it is an easy to read raw CAN file that can also be processed though the tool in order to get a full engineering units file. The engineering units file must use a DBC to get signal information and is outputted in a .CSV file format. Additional features include message ID filtering, which allows the user to select IDs to keep or remove. However, this is optional in the file conversion process. As seen below, the tool's interface has a CAN Traffic monitor that shows all CAN messages on whichever bus the PC is currently connected to. This is a useful feature for rapid debugging.



CAN Logging Tool Screen in Raptor™-CAN

Data Format Comparisons

VeeCAN 320 and 320 Lite Data Logger Format:

Msg ID	Msg Type	DLC	Data	Timestamp
0x0CF00400,	1,	8,	0x00,0x00,0x00,0xCC,0x10,0x00,0x00,0x00,	302568000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0x33,0x10,0x00,0x00,0x00,	302591000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0x9C,0x0F,0x00,0x00,0x00,	302616000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0x07,0x0F,0x00,0x00,0x00,	302641000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0x75,0x0E,0x00,0x00,0x00,	302666000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0xE5,0x0D,0x00,0x00,0x00,	302691000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0x58,0x0D,0x00,0x00,0x00,	302716000
0x0CF00400,	1,	8,	0x00,0x00,0x00,0xCE,0x0C,0x00,0x00,0x00,	302741000

File Example:

File extension: .mel

```
0x0CF00400,1,8,0x00,0x00,0x00,0xCC,0x10,0x00,0x00,0x00,302568,000
0x0CF00400,1,8,0x00,0x00,0x00,0x33,0x10,0x00,0x00,0x00,302591,000
0x0CF00400,1,8,0x00,0x00,0x00,0x9C,0x0F,0x00,0x00,0x00,302616,000
0x0CF00400,1,8,0x00,0x00,0x00,0x07,0x0F,0x00,0x00,0x00,302641,000
0x0CF00400,1,8,0x00,0x00,0x00,0x75,0x0E,0x00,0x00,0x00,302666,000
0x0CF00400,1,8,0x00,0x00,0x00,0xE5,0x0D,0x00,0x00,0x00,302691,000
0x0CF00400,1,8,0x00,0x00,0x00,0x58,0x0D,0x00,0x00,0x00,302716,000
0x0CF00400,1,8,0x00,0x00,0x00,0xCE,0x0C,0x00,0x00,0x00,302741,000
```

rCAN Format*:

Channel	ID	Type	DLC	Data	Timestamp	Tx/Rx
1	0CF00400	X	8	00 00 00 CC 10 00 00 00	3.02568	R
1	0CF00400	X	8	00 00 00 33 10 00 00 00	3.02591	R
1	0CF00400	X	8	00 00 00 9C 0F 00 00 00	3.02616	R
1	0CF00400	X	8	00 00 00 07 0F 00 00 00	3.02641	R
1	0CF00400	X	8	00 00 00 75 0E 00 00 00	3.02666	R
1	0CF00400	X	8	00 00 00 E5 0D 00 00 00	3.02691	R
1	0CF00400	X	8	00 00 00 58 0D 00 00 00	3.02716	R
1	0CF00400	X	8	00 00 00 CE 0C 00 00 00	3.02741	R

File Example:

File extension: .rCAN

```
1        0CF00400 X    8 00  00  00  CC  10  00  00  00      3.02568 R
1        0CF00400 X    8 00  00  00  33  10  00  00  00      3.02591 R
1        0CF00400 X    8 00  00  00  9C  0F  00  00  00      3.02616 R
1        0CF00400 X    8 00  00  00  07  0F  00  00  00      3.02641 R
1        0CF00400 X    8 00  00  00  75  0E  00  00  00      3.02666 R
1        0CF00400 X    8 00  00  00  E5  0D  00  00  00      3.02691 R
1        0CF00400 X    8 00  00  00  58  0D  00  00  00      3.02716 R
1        0CF00400 X    8 00  00  00  CE  0C  00  00  00      3.02741 R
```

The VeeCAN 320 Data Logger (.mel) file does not log the CAN channel in its raw form, this data in the converted .rCAN format will always output 0.