

Yacht Devices

User Manual

CAN Log Viewer

Software version
1.80

2026

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Web: <http://www.yachtd.com/>

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1. Introduction

This manual explains how to install, configure and use CAN Log Viewer (referred to below as the Viewer or the program).

CAN Log Viewer displays, plays and converts CAN (Controller Area Network) logs and displays Raymarine SeaTalk NG logs. It plays recordings on a PC screen in real time and highlights changing data. It can also display and record RAW protocol data from TCP or UDP ports of the Yacht Devices NMEA 2000 Wi-Fi Gateway YDWG-02, Wi-Fi Router YDNR-02 and Ethernet Gateway YDEN-02, or from the serial (COM) port of the NMEA 2000 USB Gateway YDNU-02 (collectively, YD gateways).

The program includes viewers for NMEA 2000 and J1939 data, allowing network data to be visualised in a readable form. The viewers also allow you to see what data is and is not available on the network.

The program lists NMEA 2000 devices and displays their product and configuration information. When connected to a CAN network via a YD gateway, it can also discover devices, change their network addresses, device and system instances, and configuration information. Some manufacturers use configuration information to change device settings. The program can also update supported devices (see Chapter 4).

This product will help you to:

- view live and recorded network data in binary and readable form (using built-in viewers available for the major J1939 and NMEA 2000 data types);
- list, configure and update NMEA 2000 devices (see Chapter 4);
- set up and troubleshoot NMEA 2000 and J1939 devices (more than 2000 J1939 DTC descriptions in the database);
- analyze unknown CAN protocols (see Chapter 7 for a real example);
- download and upload CZone configuration files to network devices;
- convert log files to spreadsheet and text formats for further processing;
- convert data prepared in a spreadsheet or text file for playback on a physical CAN network by Voyage Recorder;
- convert CAN logs containing NMEA 2000 data to the format of the YDVR Converter software (.DAT file);
- send CAN messages to the network.

CAN logs contain network-level data and support any higher-level protocol, including J1939 and NMEA 2000. This program was designed to support our hardware products, but its data formats are open and conversion to and from CSV (comma-separated values) is supported. You can therefore use your own log files or add .CAN support to your products.

Please see Appendix A for the list of products supporting the .CAN file format.

This tool is freeware and you may distribute it in unmodified form without any special permission.

2. Program installation

CAN Log Viewer 1.80 is free of charge. The current version supports:

- Windows 10 version 1809 or later, or Windows 11 (64-bit x86).
- Linux on x86_64: Ubuntu 22.04 or a compatible system with glibc 2.35 or later, X11 or XWayland, and the required system libraries.
- macOS 13 or later, on Intel Macs and Apple silicon (universal application).

Versions for older operating systems are available at www.yachtd.com.

Extract the archive for your operating system to a folder on your computer or a USB drive. The included “Test” folder contains sample recordings.



Linux

If necessary, enable “Allow executing file as program” in the file properties, or run `chmod +x CANView`. The system’s X11/XCB, xkbcommon, DBus and standard runtime libraries must be installed.



macOS

Open the supplied DMG in Finder and drag CANView to Applications. The current build uses an ad-hoc signature and is not notarised.

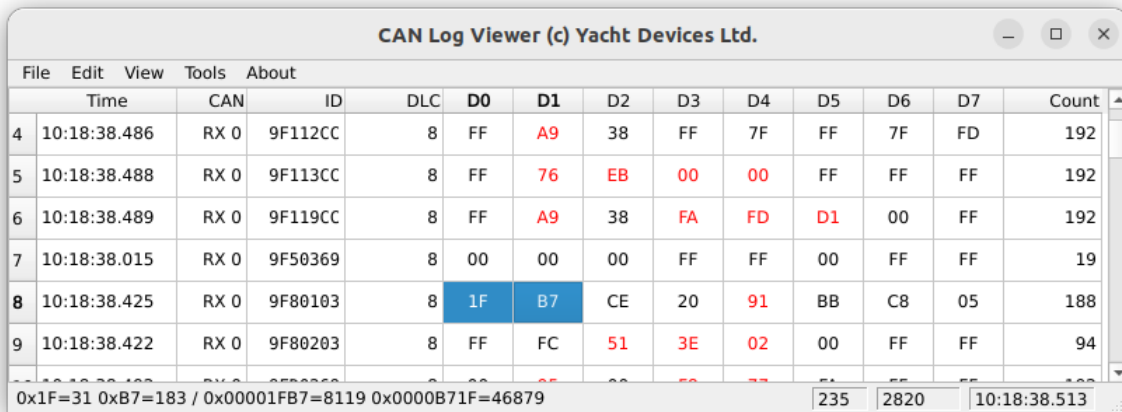


Windows

Run CANView.exe from the extracted folder. No separate Visual C++ Redistributable is required.

3. Getting started

The sample file VolvoXC90.can contains a recording from a Volvo XC90. Load it using “Open...” in the “File” menu. To open a Raymarine SeaTalk NG log, select “Raymarine (*.log)” as the file type in the dialog.



The screenshot shows the CAN Log Viewer application window. The title bar reads "CAN Log Viewer (c) Yacht Devices Ltd.". The menu bar includes File, Edit, View, Tools, and About. The main table displays a list of CAN messages with columns: Time, CAN, ID, DLC, D0, D1, D2, D3, D4, D5, D6, D7, and Count. The data is as follows:

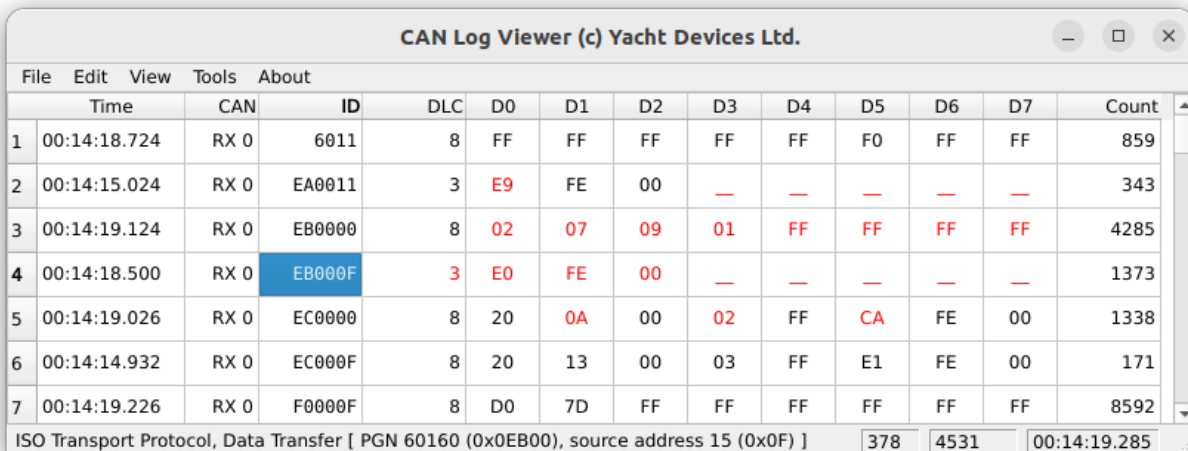
	Time	CAN	ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7	Count
4	10:18:38.486	RX 0	9F112CC	8	FF	A9	38	FF	7F	FF	7F	FD	192
5	10:18:38.488	RX 0	9F113CC	8	FF	76	EB	00	00	FF	FF	FF	192
6	10:18:38.489	RX 0	9F119CC	8	FF	A9	38	FA	FD	D1	00	FF	192
7	10:18:38.015	RX 0	9F50369	8	00	00	00	FF	FF	00	FF	FF	19
8	10:18:38.425	RX 0	9F80103	8	1F	B7	CE	20	91	BB	C8	05	188
9	10:18:38.422	RX 0	9F80203	8	FF	FC	51	3E	02	00	FF	FF	94

At the bottom, there are three status boxes: "0x1F=31 0xB7=183 / 0x00001FB7=8119 0x0000B71F=46879", "235", "2820", and "10:18:38.513".

Figure 1. Viewer with a loaded file

The Viewer plays the file and shows the recording device’s internal time in the bottom-right corner. Playback follows real time, but may slow down under a high network load. The other two status boxes show the numbers of messages and bytes received in the last second.

The format records transmitted (TX) and received (RX) messages from two CAN interfaces, numbered 0 and 1. Messages with the same ID, interface and direction share a row and a counter in the table.



The screenshot shows the CAN Log Viewer application window. The title bar reads "CAN Log Viewer (c) Yacht Devices Ltd.". The menu bar includes File, Edit, View, Tools, and About. The main table displays a list of CAN messages with columns: Time, CAN, ID, DLC, D0, D1, D2, D3, D4, D5, D6, D7, and Count. The data is as follows:

	Time	CAN	ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7	Count
1	00:14:18.724	RX 0	6011	8	FF	FF	FF	FF	FF	F0	FF	FF	859
2	00:14:15.024	RX 0	EA0011	3	E9	FE	00	—	—	—	—	—	343
3	00:14:19.124	RX 0	EB0000	8	02	07	09	01	FF	FF	FF	FF	4285
4	00:14:18.500	RX 0	EB000F	3	E0	FE	00	—	—	—	—	—	1373
5	00:14:19.026	RX 0	EC0000	8	20	0A	00	02	FF	CA	FE	00	1338
6	00:14:14.932	RX 0	EC000F	8	20	13	00	03	FF	E1	FE	00	171
7	00:14:19.226	RX 0	F0000F	8	D0	7D	FF	FF	FF	FF	FF	FF	8592

At the bottom, there are three status boxes: "ISO Transport Protocol, Data Transfer [PGN 60160 (0x0EB00), source address 15 (0x0F)]", "378", "4531", and "00:14:19.285".

Figure 2. Messages with variable length

Modified bytes are highlighted in red. The message length (DLC column) is also highlighted when changed. If the message length is less than 8 bytes, the cells of the remaining bytes will be empty or will contain a highlighted "___" if the value of that cell was not previously empty.

Select one or more data cells to see their hexadecimal values converted to decimal in the status bar. “Copy Selection” in the “Edit” menu copies the selected cells to the clipboard.

Use “Stop” and “Play” in the “File” menu to pause and resume playback. To clear the table, select “Clear Table and Viewers” in the “Edit” menu.

When playback finishes or is stopped, you can open another file or reopen the same file to play it from the beginning.

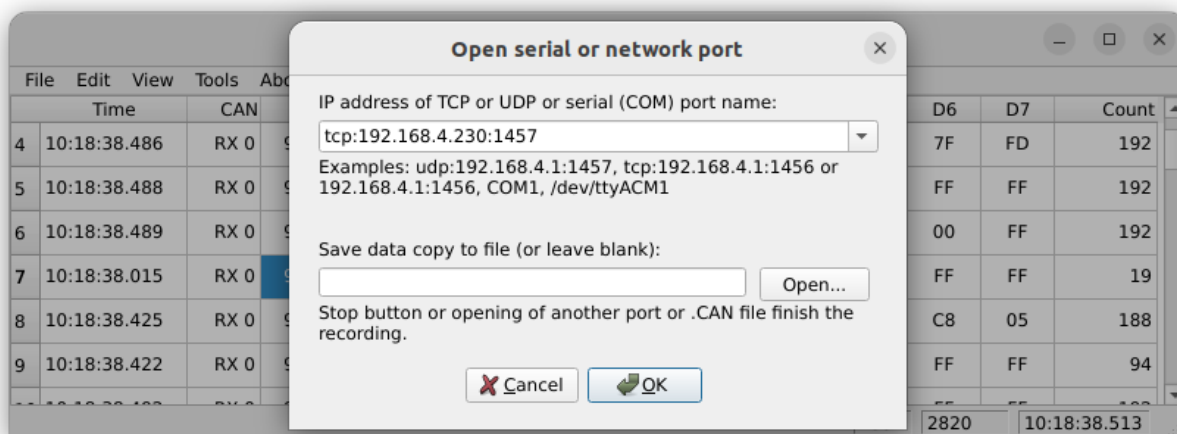


Figure 3. Open port dialog

“Open Port...” opens the serial (COM) port of a Yacht Devices NMEA 2000 USB Gateway YDNU-02, or a TCP or UDP port of a YD gateway. Configure the gateway port for the RAW protocol, or AUTO on the USB Gateway.

For UDP, include the “udp:” prefix, for example udp:192.168.4.1:1457, where 192.168.4.1 is the gateway’s address. With udp:0.0.0.0:1457, the program receives packets from all IP addresses and broadcasts replies. For TCP, the “tcp:” prefix is optional: for example, 192.168.4.230:1457.

“Stop” does not close the serial port or TCP connection; it skips messages until you select “Play”. To close the port, select “Stop”, then “Close All” in the “File” menu, or open another file or port.

You can also record port data to a .CAN file. Recording ends when you select “Close All”, open another port or open a .CAN file from disk.

CAN Log Viewer (c) Yacht Devices Ltd.

FileEditViewToolsAbout

	Time	CAN	ID	DLC	D0	D1
1	00:00:51.748	RX 0	6011	8	FF	FF
2	00:00:50.047	RX 0	EA0011	3	E9	FE
3	00:00:51.731	RX 0	EB0000	8	01	2D
4	00:00:51.520	RX 0	EB000F	3	BE	FE
5	00:00:51.682	RX 0	EC0000	8	20	23
6	00:00:49.879	RX 0	EC000F	8	20	13
7	00:00:51.772	RX 0	F0000F	8	D0	7D
8	00:00:51.732	RX 0	F00E00	8	FF	FF
9	00:00:51.732	RX 0	F00F00	8	FF	FF
10	00:00:50.933	RX 0	FD6E00	8	FF	FF
11	00:00:51.073	RX 0	FD7B00	8	FF	FF
12	00:00:51.083	RX 0	FD7C00	8	F8	83
13	00:00:51.752	RX 0	FD9400	8	00	00
14	00:00:51.362	RX 0	FDA100	8	FF	FF
15	00:00:51.462	RX 0	FE6A00	8	FF	2F
16	00:00:51.733	RX 0	FE9400	8	FF	FF
17	00:00:51.734	RX 0	FEBD00	8	FF	FF
18	00:00:51.753	RX 0	FEDF00	8	84	FF
19	00:00:51.033	RX 0	FEE400	8	FF	FF
20	00:00:50.077	RX 0	FEE500	8	67	24

J1939 Engine #0

	Parameter	Value	Unit	Updated (addr)
1	Engine Speed	0	RPM	00:00:51.777 (00)
2	Engine Load	0	%	00:00:51.752 (00)
3	Actual Torque	0	%	00:00:51.777 (00)
4	Coolant Temperature	16	°C	00:00:51.162 (00)
5	Boost Pressure	0	kPa	00:00:51.734 (00)
6	Air Inlet Pressure	102	kPa	00:00:51.734 (00)
7	Fuel rate	0.0	L/h	00:00:51.747 (00)
8	Fuel level 1		%	
9	Fuel level 2		%	
10	Throttle		%	
11	Oil Pressure	0	kPa	00:00:51.357 (00)
12	Coolant Pressure		kPa	
13	Charging Potential		V	
14	Alternator Current		A	
15	Battery / Power Input 1		V	
16	Net Battery Current		A	
17	Keyswitch Battery	28.2	V	00:00:50.983 (00)
18	Hours	466.0	h	00:00:50.077 (00)
19	Exhaust Gas		°C	

383

4587

00:00:51.777

Figure 4. J1939 data viewer

The “View” menu opens viewers that display J1939 and NMEA 2000 data in a readable form. Use them to identify the data available on the network or as simple information displays.

The viewers show major J1939 engine data and active diagnostic trouble codes (DTCs), using a database of more than 2000 error descriptions. They also show NMEA 2000 engine data for two engines, navigation data (GPS position, COG/SOG, STW/HDG, depth, etc.) and environmental data (wind, temperature, pressure and humidity). Choose “Unit Settings...” in the “View” menu to set the display units.

The program can display and control NMEA 2000 digital switching devices using PGN 127501 “Binary Status Report” and PGN 127502 “Switch Bank Control”.

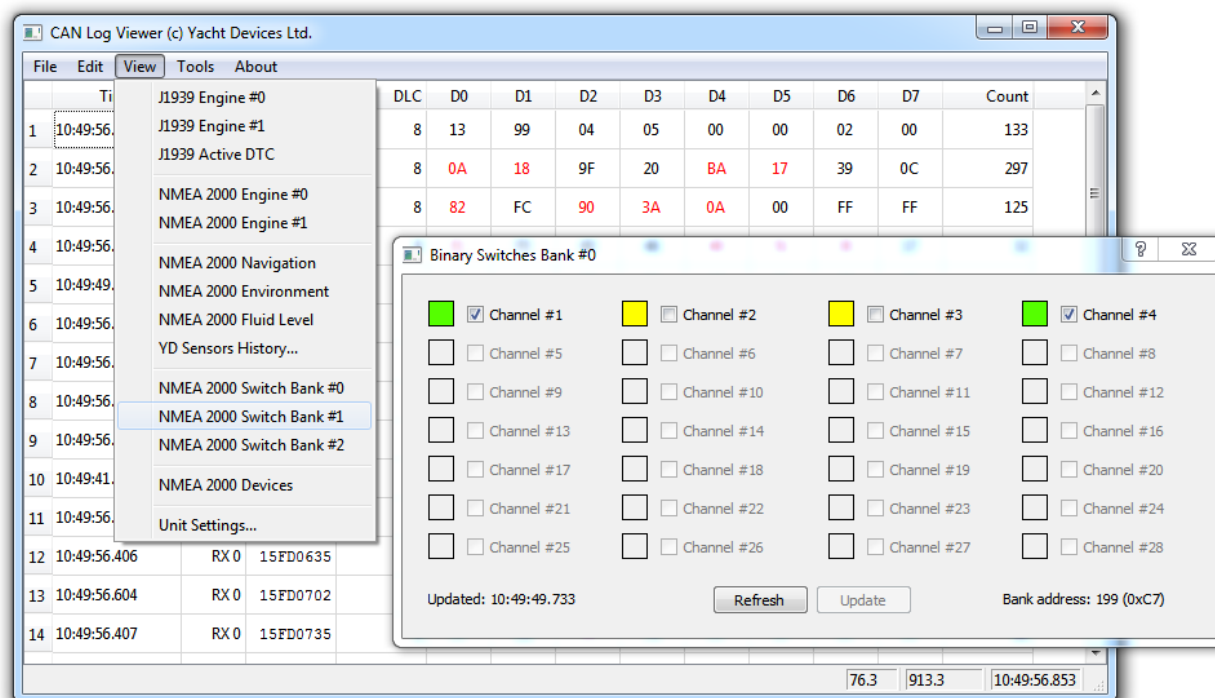


Figure 5. Digital switching loads management

You can manage three devices (banks 0 to 2); see the “View” menu in Figure 5. Green channels are on, yellow channels are off, red indicates an error and grey means unavailable. To change a channel’s state, select its checkbox and press “Update”.

The program is compatible with the [Yacht Devices Circuit Control YDCC-o4](#) and should be compatible with standard NMEA 2000 digital switchers. It does not support CZone or EmpirBus devices because these companies use proprietary messages to switch channels.

However, in the Tools menu you'll find "Upload ZCF File..." and "Download ZCF File..." to upload the configuration file to CZone devices and CZone compatible plotters, and to make a backup of your configuration file. Please note that CAN Log Viewer is not certified by CZone and you use it at your own risk. The download/upload progress is displayed in the status bar of the main window.

Our sensors (Barometer, Thermometer, Exhaust Gas Sensor and Humidity Sensor) with firmware 1.50 or later store up to 48 hours of history in RAM. CAN Log Viewer can retrieve these data. Open up to ten history windows (Figure 6) to view different devices or time resolutions simultaneously. The history download protocol is open and documented in the sensor manuals.

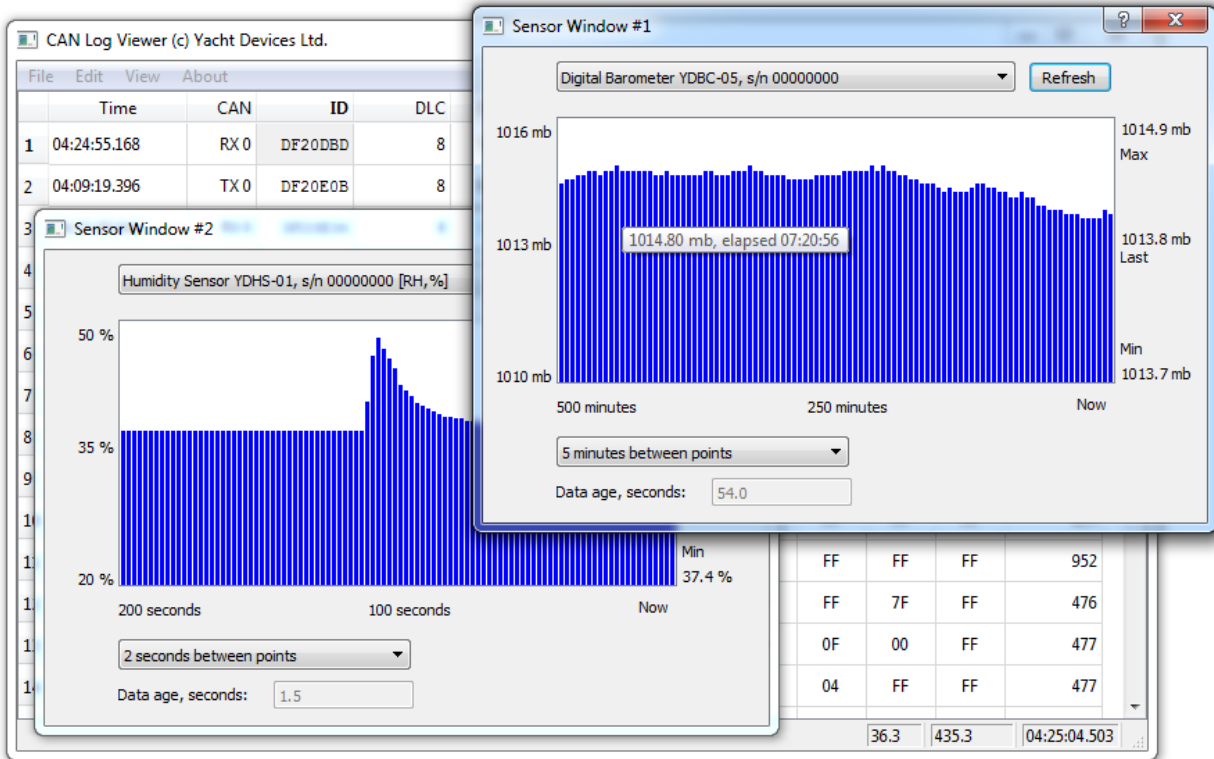


Figure 6. History windows

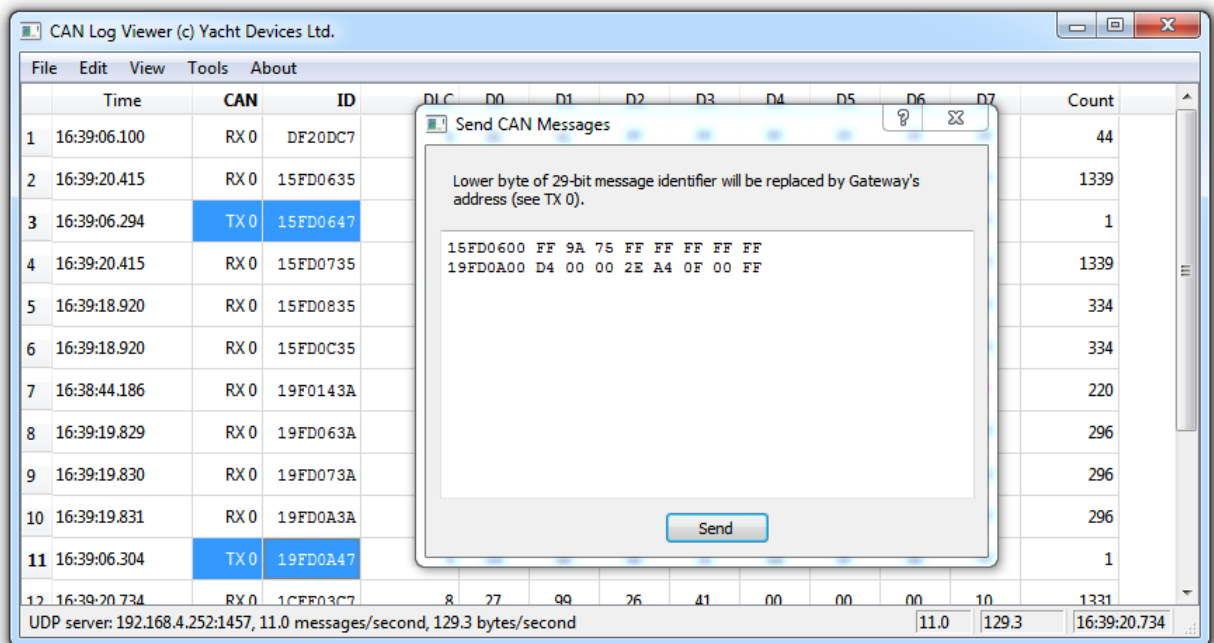


Figure 7. "Send CAN Messages" window

The program can send CAN frames with a 29-bit identifier and 1 to 8 data bytes (Figure 7). Open “Send CAN Messages” from the “Tools” menu while connected to a CAN network through a YD gateway.

“Send” displays an error if the entered text is invalid. Otherwise, it sends the messages without a confirmation dialog, so you can press it repeatedly to send the same messages again.

After the gateway transmits the messages, CAN Log Viewer lists them with “TX o” in the main window’s “CAN” column (see rows 3 and 11 in Figure 7).

The gateway replaces the lowest byte of the 29-bit identifier with its CAN address, as required by NMEA 2000. In Figure 7, the message entered as 15FD0600 therefore appears as 15FD0647 in the main window.

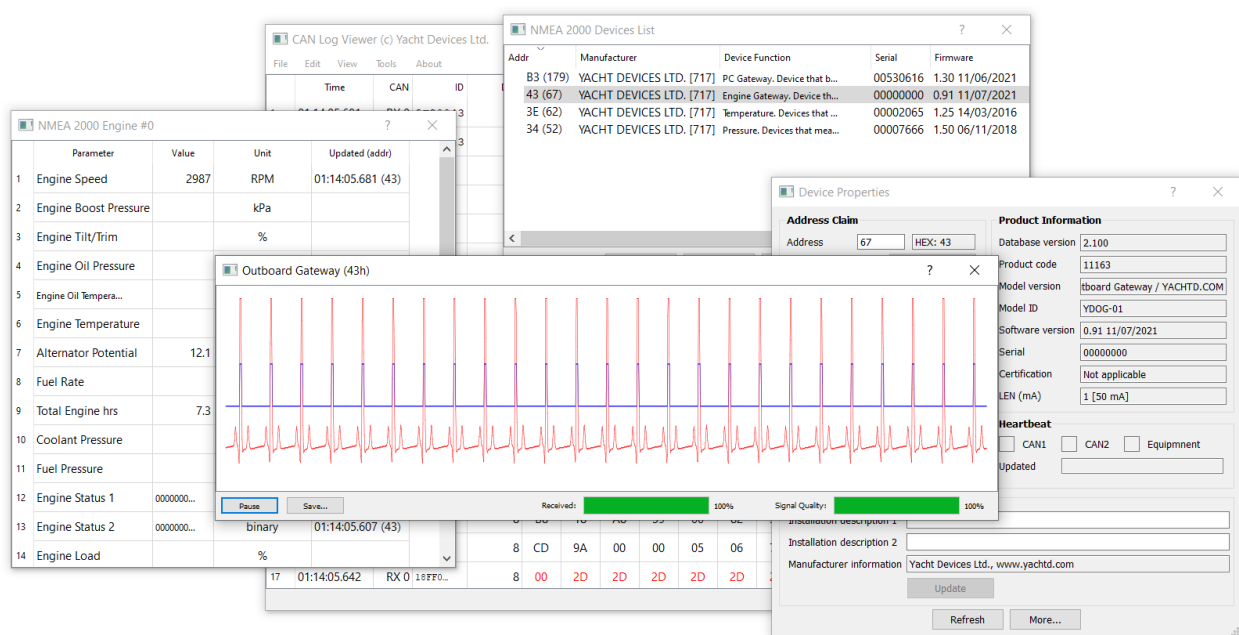


Figure 8. Input signal of Outboard Gateway

The CAN Log Viewer also allows you to view the input signal of the Outboard Gateway in real time (it counts spark plug signals to count engine revolutions, see Figure 8). To open this window, select the gateway in the "Device List", open "Device Properties" and click on "More...". The red line shows the signal as seen by the Outboard Gateway, the blue line shows the pulses detected by the gateway. The 'Signal Quality' in the bottom right corner is the Gateway's AI rating (good values are in the range of 60-100%). The "Received" progress bar shows how many points of the current oscillogram have been received by the CAN Log Viewer from the device.

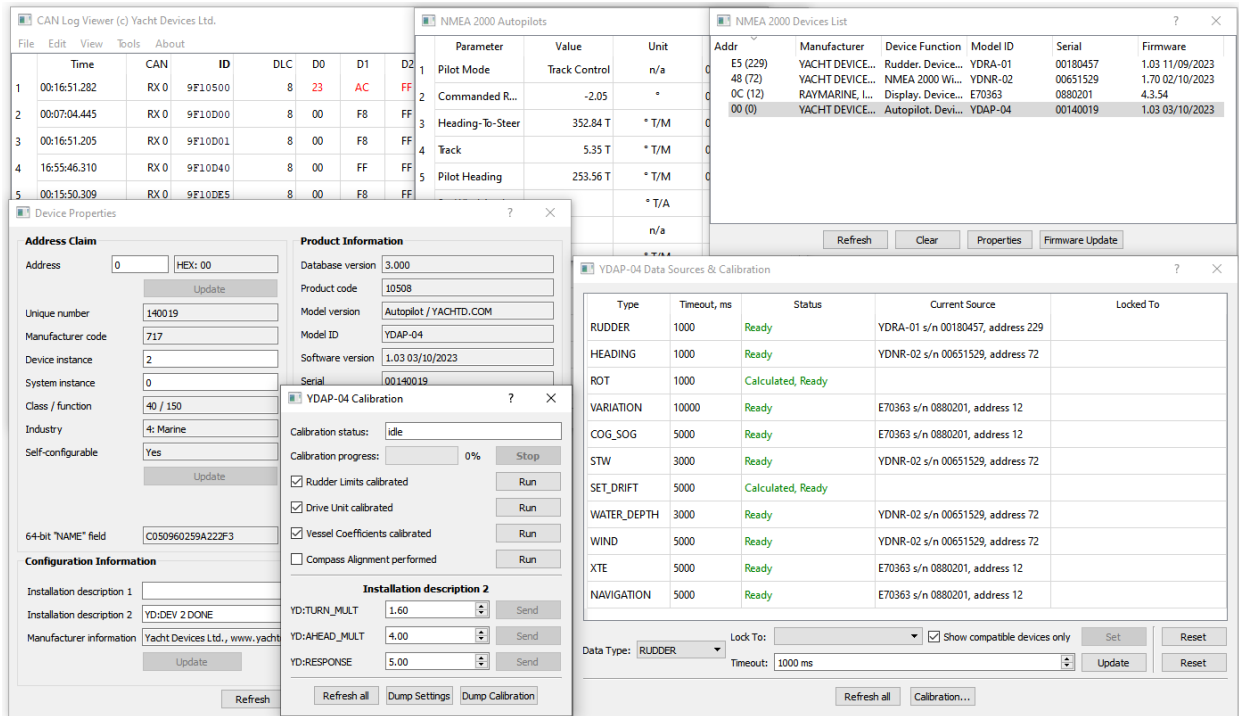
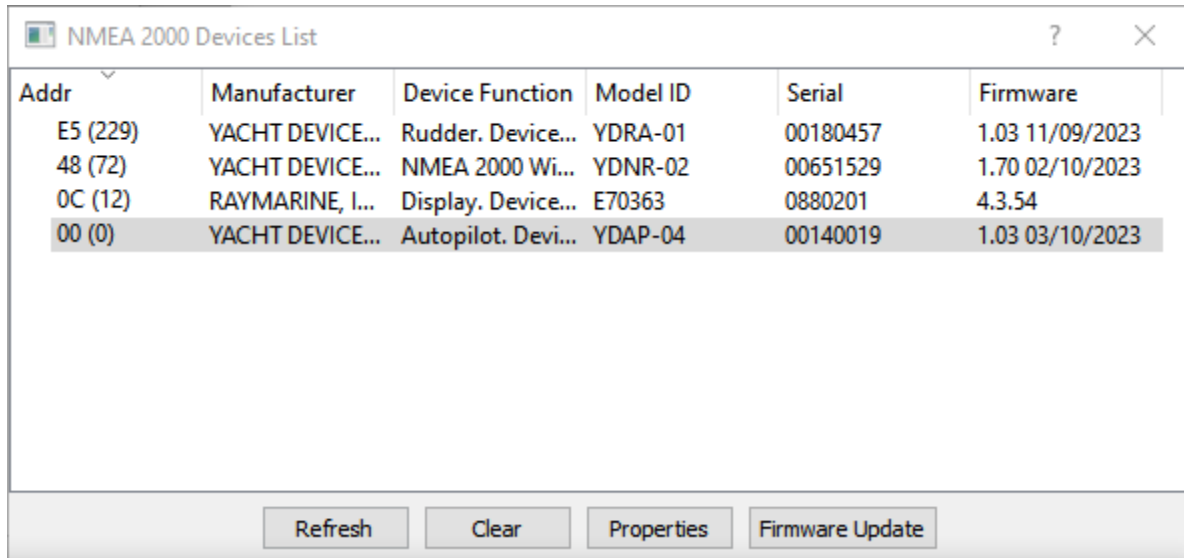


Figure 9. Commissioning of YD Autopilot

The Viewer provides tools for commissioning and troubleshooting the YD Autopilot, accessible through “More...” in “Device Properties”. The “NMEA 2000 Autopilots” window in the “View” menu displays the autopilot mode, course and other data. See the YD Autopilot Installation and Commissioning Manual for details.

4. List of NMEA 2000 devices



Addr	Manufacturer	Device Function	Model ID	Serial	Firmware
E5 (229)	YACHT DEVICE...	Rudder. Device...	YDRA-01	00180457	1.03 11/09/2023
48 (72)	YACHT DEVICE...	NMEA 2000 Wi...	YDNR-02	00651529	1.70 02/10/2023
0C (12)	RAYMARINE, I...	Display. Device...	E70363	0880201	4.3.54
00 (0)	YACHT DEVICE...	Autopilot. Devi...	YDAP-04	00140019	1.03 03/10/2023

Buttons: Refresh, Clear, Properties, Firmware Update

Figure 10. List of NMEA 2000 devices

Select “NMEA 2000 Devices” in the “View” menu to open the list in Figure 10. It includes devices that have sent ISO Address Claim, Product Information, Heartbeat or Configuration Information messages (PGNs 60928, 126996, 126993 and 126998, respectively) since the window was opened. Press “Clear” to empty the list.

When connected to a YD gateway, “Refresh” clears the list and requests information from devices on the NMEA 2000 network. The sent requests appear in the program’s main window.

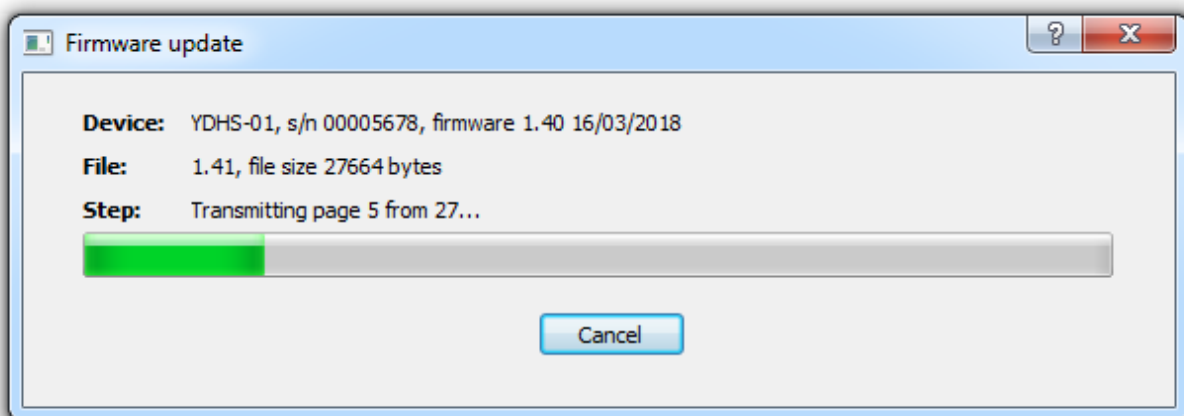


Figure 11. Firmware update window

“Firmware Update” is enabled when the program is connected to a gateway and the selected device is supported (see Appendix B). Select the update file with a .BIN extension and wait for the upload to finish (Figure 11).

The screenshot shows a 'Device Properties' window with the following sections:

- Address Claim:**
 - Address: 52 (with HEX: 34) and an Update button.
 - Unique number: 5678
 - Manufacturer code: 717
 - Device instance: 0
 - System instance: 0
 - Class / function: 75 / 170
 - Industry: 4: Marine
 - Self-configurable: Yes
 - Update button.
- Product Information:**
 - Database version: 1.301
 - Product code: 588
 - Model version: Humidity Sensor / YACHTD.COM
 - Model ID: YDHS-01
 - Software version: 1.40 16/03/2018
 - Serial: 00005678
 - Certification: Not applicable
 - LEN (mA): 1 [50 mA]
- Heartbeat:**
 - Buttons: CAN1 (selected), CAN2, Equipment.
 - Updated: 00:33:36.907
- Configuration Information:**
 - Installation description 1: [empty text box]
 - Installation description 2: [empty text box]
 - Manufacturer information: Yacht Devices Ltd., www.yachtd.com
 - Update button.
- Refresh:** A button at the bottom center.

Figure 12. Device properties window

Double-click a device in the list or press “Properties” to open the window in Figure 12. When connected to a gateway, “Refresh” requests data from the selected device only.

The “Update” buttons change the editable fields (white in Figure 12). A button is enabled when the value is valid, differs from the device’s reported value and a YD gateway is connected. Avoid pressing “Enter” after

editing a field: depending on the operating system, this may activate another button. Click the intended button with the mouse or select it with “Tab” first.

To change a device address, the program uses “ISO Commanded Address” (PGN 65240, transported in PGNs 60160 and 60416), which modern NMEA 2000 certified devices must support. Other fields are changed using “NMEA Group Function” (PGN 126208).

Configuration information normally describes the installation, such as the device’s location. Many manufacturers also use these fields to send commands. For an example, see “VI. Programming with Installation Description String” in the Yacht Devices Humidity Sensor manual at www.yachtd.com.

The “Heartbeat” section shows the device’s state. Under the standard, modern NMEA 2000 devices report their presence once per minute. Green indicates a healthy state, yellow indicates an error and red indicates a critical error. An uncoloured indicator means the device has not provided its value.

5. Program's command line

Run the program with `/?` to see the command-line options. These options affect both playback and file conversion.

Key	Description	Example
<code>/F:filename</code>	Load a file at startup, or open a TCP, UDP or serial port.	<code>/F:C:/files/my.dat</code> <code>/F:tcp:10.1.1.1:1456</code>
<code>/E:id1[;...]</code>	Exclude these hexadecimal message IDs from playback and conversion; separate IDs with semicolons.	<code>/E:1A2;1A4;18EA2001</code>
<code>/M:filter1;mask1[;...]</code>	List of permissive hexadecimal filter / mask pairs. The filter defines bits to compare; the mask selects which bits matter. Only messages with matching identifiers are displayed or converted.	<code>/M:18EA2000;1FFFF</code> <code>Foo;0DF10200;1FFFF</code> <code>Foo</code>
<code>/C:number</code>	Use only the specified CAN interface (0 or 1).	<code>/C:0</code>
<code>/D:direction</code>	Use only the specified direction (TX or RX).	<code>/D:TX</code>

The following command filters messages as shown in Figure 13:

```
CANView.exe /F:VolvoXC90.can /M:1E;FF;20;FF /E:1000020;62401E /C:0 /D:RX
```

	Time	CAN	ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7	Count
1	00:00:43.066	RX 0	80401E	8	1E	02	05	6C	00	4B	72	00	619
2	00:00:43.046	RX 0	10400020	8	81	2B	47	6B	8E	C3	0E	12	229
3	00:00:42.898	RX 0	10600020	8	02	47	87	00	49	01	54	53	17
4	00:00:43.019	RX 0	11A00020	8	40	00	00	5E	C2	1F	00	00	47

Figure 13. Loading of file with parameters

Command-line options reduce the amount of displayed data. They also affect file conversion (see Chapter 6) and remain active until the program exits.

6. Data export and conversion

Data export and conversion commands are available in the “Edit” menu. Select a command, then choose the source file and the output file.

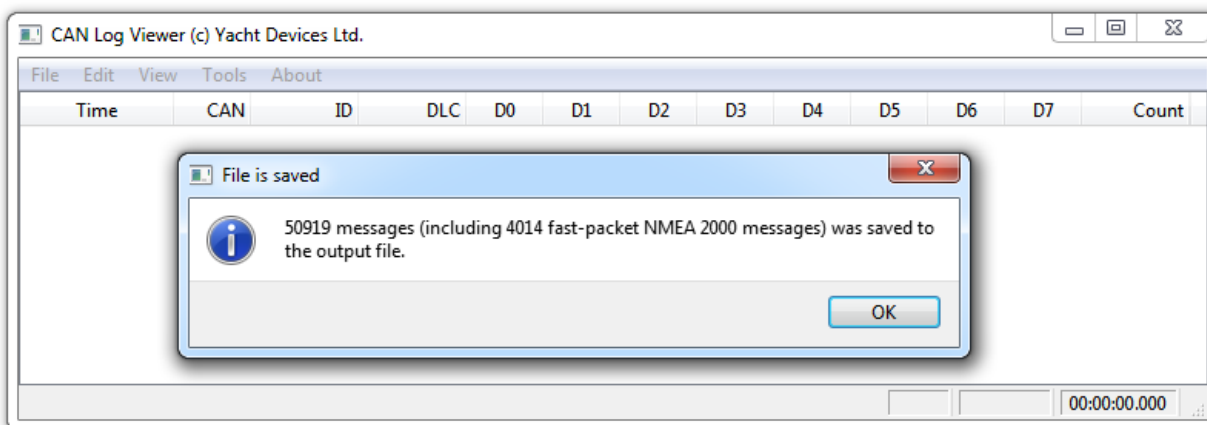


Figure 14. File conversion message

When conversion finishes, a message box displays the result.

Command-line options also affect conversion. For example, starting the program with `/E:80401E` excludes messages with identifier 80401E from the output file.

Export messages to CSV to analyse them in Microsoft Excel, LibreOffice Calc or another spreadsheet application. CSV files can also be opened in a text editor.

When converting from CSV, retain the original column order and separate values with commas.

CSV format is one option to get data into an editable form. For example, you may modify data in CSV format, convert it back to .CAN format and “play” this file on a physical CAN bus with Voyage Recorder.

Export to text format is an option to get an easily readable file for a text editor, but text format files can’t be converted back to .CAN format.

.DAT is a special format for NMEA 2000 networks used in Voyage Recorder to record data and supported in the free YDVR Converter software. With YDVR Converter software, you may convert .DAT files to .CAN format. The .DAT file format is described in the manual of Voyage Recorder.

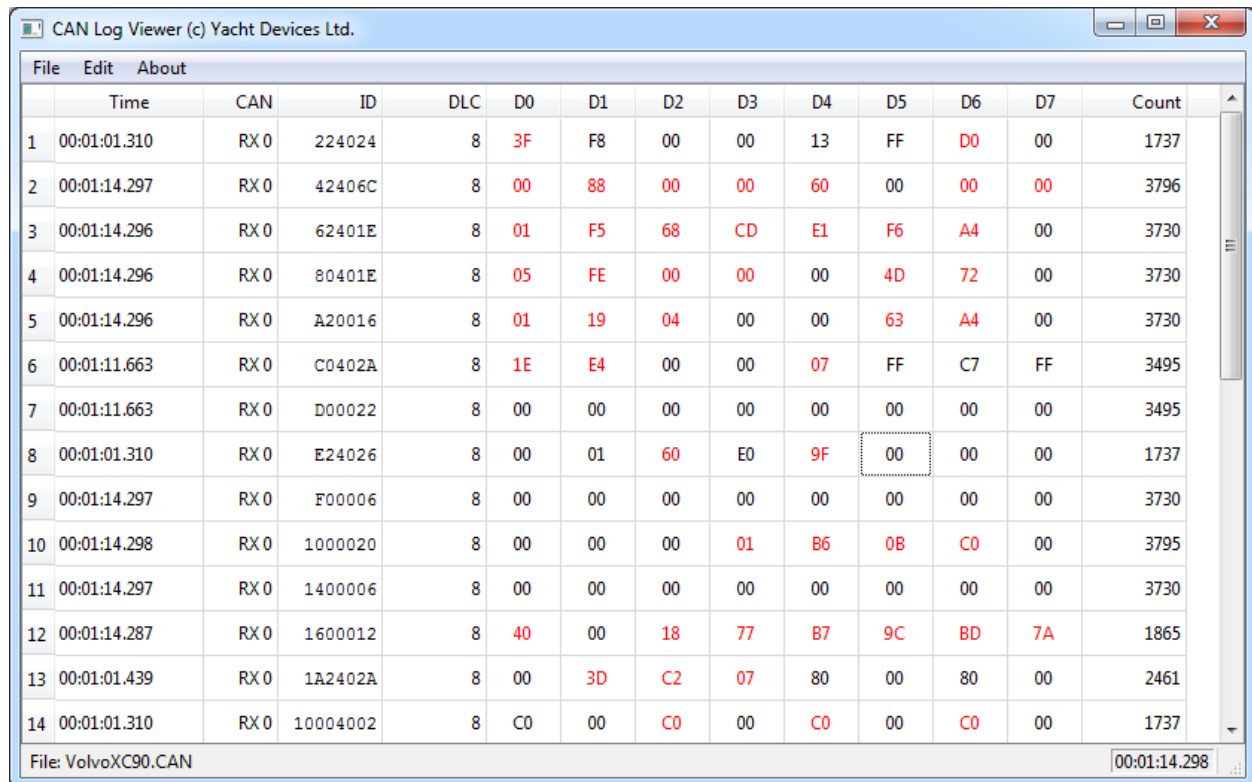
7. Example of protocol analysis

This chapter demonstrates CAN protocol analysis using a Volvo XC90 recording. Vehicle protocols, including this one, are often undocumented.

The sample VolvoXC90.can recording starts at 00:36. The driver switches on the ignition and starts the engine, which initially runs at 1400-1600 rpm to warm up. The driver waits for the speed to fall to about 950 rpm, then stops the engine. Recording ends about ten seconds later, at 01:14.

Our goal is to locate engine speed data. We expect a value of at least two bytes that is near zero at the start and end of the recording. We do not know the scale (for example, 1 or 4 counts per rpm), but the tachometer ranges from 0 to 8000 rpm, so the encoded value should remain in the lower half of a 16-bit range.

The value should change frequently: when the controller targets 1300 rpm, the actual speed may fluctuate between 1250 and 1350 rpm.



	Time	CAN	ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7	Count
1	00:01:01.310	RX 0	224024	8	3F	F8	00	00	13	FF	D0	00	1737
2	00:01:14.297	RX 0	42406C	8	00	88	00	00	60	00	00	00	3796
3	00:01:14.296	RX 0	62401E	8	01	F5	68	CD	E1	F6	A4	00	3730
4	00:01:14.296	RX 0	80401E	8	05	FE	00	00	00	4D	72	00	3730
5	00:01:14.296	RX 0	A20016	8	01	19	04	00	00	63	A4	00	3730
6	00:01:11.663	RX 0	C0402A	8	1E	E4	00	00	07	FF	C7	FF	3495
7	00:01:11.663	RX 0	D00022	8	00	00	00	00	00	00	00	00	3495
8	00:01:01.310	RX 0	E24026	8	00	01	60	E0	9F	00	00	00	1737
9	00:01:14.297	RX 0	F00006	8	00	00	00	00	00	00	00	00	3730
10	00:01:14.298	RX 0	1000020	8	00	00	00	01	B6	0B	C0	00	3795
11	00:01:14.297	RX 0	1400006	8	00	00	00	00	00	00	00	00	3730
12	00:01:14.287	RX 0	1600012	8	40	00	18	77	B7	9C	BD	7A	1865
13	00:01:01.439	RX 0	1A2402A	8	00	3D	C2	07	80	00	80	00	2461
14	00:01:01.310	RX 0	10004002	8	C0	00	C0	00	C0	00	C0	00	1737

File: VolvoXC90.CAN 00:01:14.298

Figure 15. Playback complete

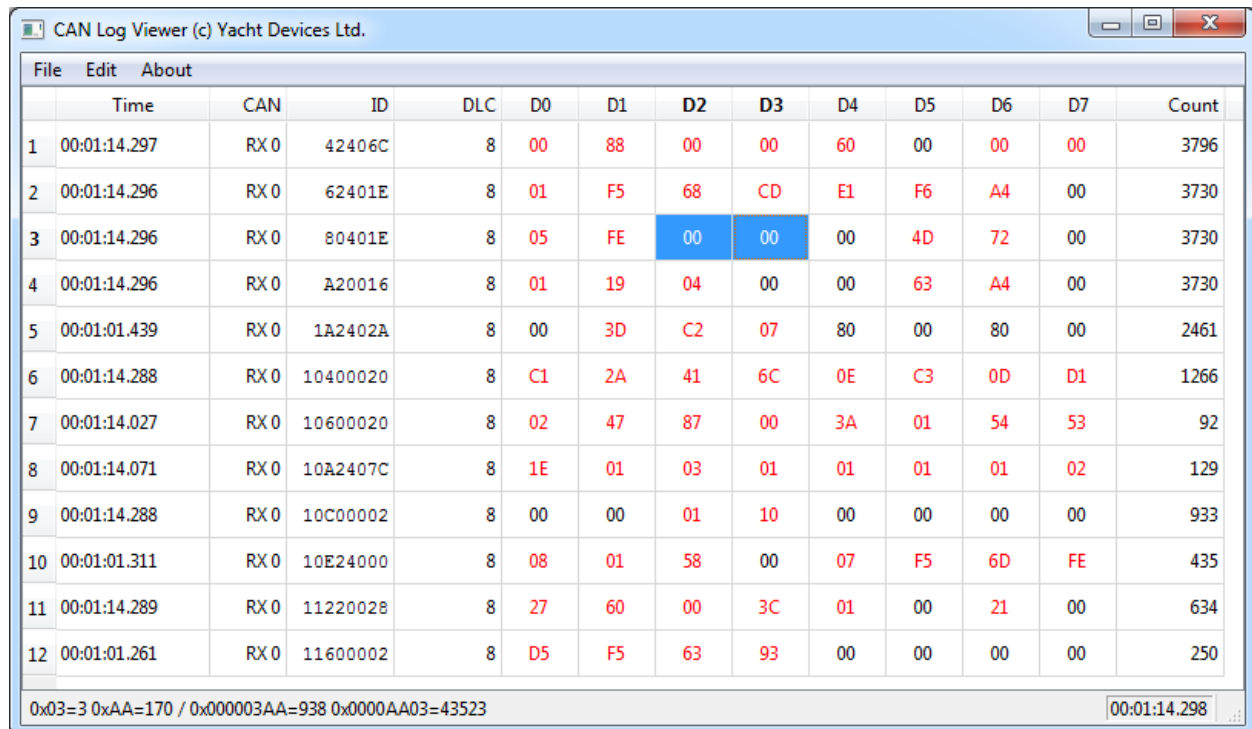
First, play the file. There are messages with 29 different identifiers. IDs 0xD00022, 0xF00006 and 0x1400006 contain only static data (Figure 15), so they cannot contain the changing RPM value. Add them to an exclusion list.

Some messages, such as 0xC0402A, change only rarely and can also be excluded. Replay the file a few times and inspect the changing bytes; this should eliminate about half of the messages.

Restart the program with the exclusion list to display only dynamic data. Enter the following command on one line:

```
CANView.exe /E:224024;C0402A;D00022;E24026;F00006;1000020;1400006;
1600012;10004002;1020000A;10800006;11000022;11100024;11420006;11800002;
11A00020;11C00002
```

Now we have only 12 messages on the screen (see Figure 16). But what values start from zero and end with zero?



	Time	CAN	ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7	Count
1	00:01:14.297	RX 0	42406C	8	00	88	00	00	60	00	00	00	3796
2	00:01:14.296	RX 0	62401E	8	01	F5	68	CD	E1	F6	A4	00	3730
3	00:01:14.296	RX 0	80401E	8	05	FE	00	00	00	4D	72	00	3730
4	00:01:14.296	RX 0	A20016	8	01	19	04	00	00	63	A4	00	3730
5	00:01:01.439	RX 0	1A2402A	8	00	3D	C2	07	80	00	80	00	2461
6	00:01:14.288	RX 0	10400020	8	C1	2A	41	6C	0E	C3	0D	D1	1266
7	00:01:14.027	RX 0	10600020	8	02	47	87	00	3A	01	54	53	92
8	00:01:14.071	RX 0	10A2407C	8	1E	01	03	01	01	01	01	02	129
9	00:01:14.288	RX 0	10C00002	8	00	00	01	10	00	00	00	00	933
10	00:01:01.311	RX 0	10E24000	8	08	01	58	00	07	F5	6D	FE	435
11	00:01:14.289	RX 0	11220028	8	27	60	00	3C	01	00	21	00	634
12	00:01:01.261	RX 0	11600002	8	D5	F5	63	93	00	00	00	00	250

0x03=3 0xAA=170 / 0x000003AA=938 0x0000AA03=43523 00:01:14.298

Figure 16. Program with filters

Bytes D2:D3 of message 0x80401E look promising; most other values are non-zero at the end. Replay the file and monitor D2:D3: the value is about 1450 at 00:40 and 920 at 01:00. This looks like engine speed.

To verify our theory, let's run the program with /M:80401E;FFFFFF as the key (to leave only this message in the output files), then convert the file to CSV and open it in Microsoft Excel.

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=HEX2DEC(I2)*256+HEX2DEC(J2)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Time	CAN	Dir	Bit	ID(hex)	DLC	D0	D1	D2	D3	D4	D5	D6	D7	RPM	
2	00:00:36.862	0	RX	29	80401E	8	1C	00	00	00	00	00	50	00	DEC(J2)	
3	00:00:36.872	0	RX	29	80401E	8	06	00	00	00	00	00	50	00		
4	00:00:36.882	0	RX	29	80401E	8	1E	00	00	00	00	00	50	00		
5	00:00:36.893	0	RX	29	80401E	8	06	00	00	00	00	00	50	00		
6	00:00:36.902	0	RX	29	80401E	8	1E	00	00	00	00	00	50	00		
7	00:00:36.912	0	RX	29	80401E	8	06	00	00	00	00	00	50	00		
8	00:00:36.922	0	RX	29	80401E	8	1E	00	00	00	00	00	50	00		
9	00:00:36.932	0	RX	29	80401E	8	06	00	00	00	00	00	50	00		

Figure 17. CSV file in Microsoft Excel

Add a column named RPM and enter this formula to calculate engine speed:

=HEX2DEC(I2)*256+HEX2DEC(J2)

Most RPM values look plausible, but the highest bit of D2 is sometimes set, producing values such as 34141 when adjacent values are around 1370 (Figure 18 on the next page).

As we can't find any pattern there, let's modify the formula to exclude the highest bit of D2 from calculation:

=IF(HEX2DEC(I2)>=128;HEX2DEC(I2)-128;HEX2DEC(I2))*256+HEX2DEC(J2)

Add a chart to see the values together (Figure 19 on the next page). The result confirms that we have found the RPM data.

CAN analysis takes practice and patience. Knowledge of data encoding in J1939 and J1979 is also useful.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
946	00:00:46.340	0	RX	29	80401E	8	1E	01	05	5D	00	4A	72	00	1373
947	00:00:46.350	0	RX	29	80401E	8	06	01	05	5D	00	4A	72	00	1373
948	00:00:46.359	0	RX	29	80401E	8	1E	01	05	5A	00	4A	72	00	1370
949	00:00:46.370	0	RX	29	80401E	8	06	00	05	5A	00	4A	72	00	1370
950	00:00:46.380	0	RX	29	80401E	8	1E	00	85	5D	00	4B	72	00	34141
951	00:00:46.390	0	RX	29	80401E	8	06	01	05	5D	00	4B	72	00	1373
952	00:00:46.399	0	RX	29	80401E	8	1E	01	05	5D	00	4B	72	00	1373
953	00:00:46.410	0	RX	29	80401E	8	06	01	05	60	00	4B	72	00	1376
954	00:00:46.420	0	RX	29	80401E	8	1E	01	05	60	00	4B	72	00	1376
955	00:00:46.430	0	RX	29	80401E	8	06	01	05	5F	00	4B	72	00	1375
956	00:00:46.440	0	RX	29	80401E	8	1E	01	05	5F	00	4B	72	00	1375
957	00:00:46.450	0	RX	29	80401E	8	05	FE	05	55	00	4B	72	00	1365
958	00:00:46.460	0	RX	29	80401E	8	1D	FE	05	58	00	4B	72	00	1368
959	00:00:46.470	0	RX	29	80401E	8	05	FF	05	58	00	4B	72	00	1368
960	00:00:46.480	0	RX	29	80401E	8	1D	FF	05	5D	00	4B	72	00	1373
961	00:00:46.490	0	RX	29	80401E	8	06	01	05	5D	00	4B	72	00	1373
962	00:00:46.500	0	RX	29	80401E	8	1E	01	05	5A	00	4B	72	00	1370
963	00:00:46.511	0	RX	29	80401E	8	06	00	05	5A	00	4B	72	00	1370

Figure 18. Strange value (line 950)

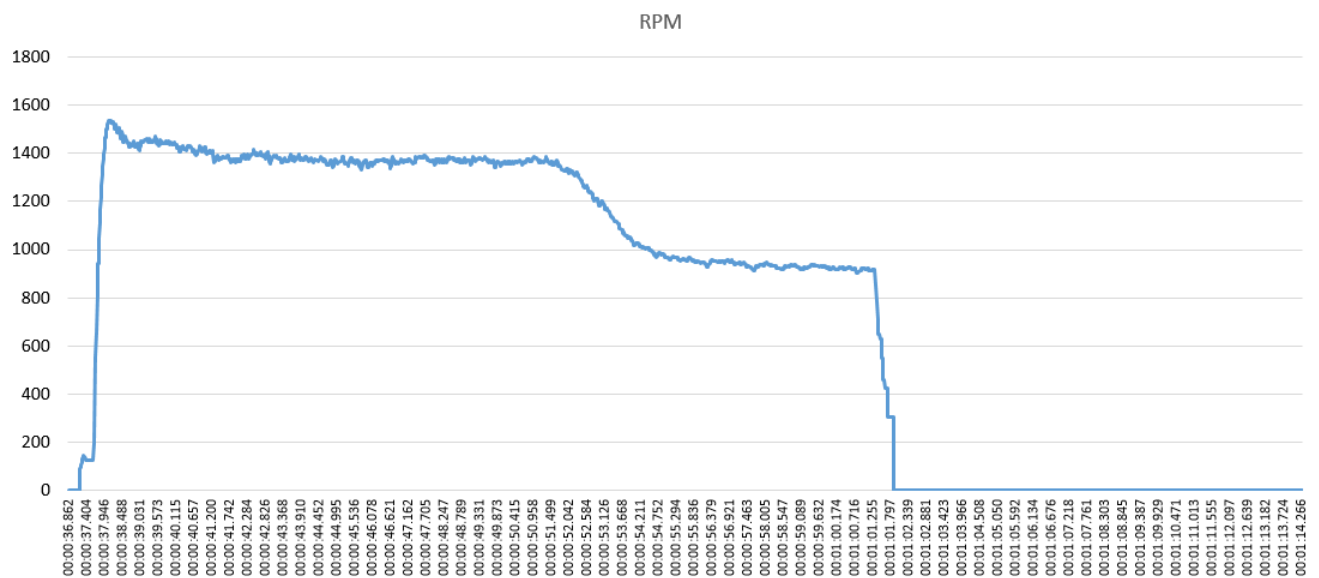


Figure 19. RPM graph in Microsoft Excel

8. Description of .CAN file format

The file format is very simple and allows CAN messages from two CAN interfaces to be stored. It also allows you to store messages received and sent by the recorder.

The CAN file contains a set of records 16 bytes long. All records have the following format:

Position from the start of the record	Length (in bytes)	Description
0	2	Bit 16: 0 = 29-bit identifier or service record; 1 = 11-bit identifier. Bit 15: 0 = received message; 1 = transmitted message or service record. Bits 12-14: data length; values 0-7 encode 1-8 bytes. Empty messages are not allowed. Bit 11: CAN interface, 0 = first, 1 = second. Bits 1-10: timestamp minutes (0-1023).
2	2	Time of record in milliseconds (0..60000)
4	4	Message identifier or 0xFFFFFFFF for service records. Unused bits of message identifier must be zero.
8	8	CAN message data or service record data. If fewer than 8 bytes are used, set the remaining bytes to 0xFF.

The file always starts with a service record containing the string "YDVR v05" in the data field.

A service record starting with 'Y' and 'I' in the first two data bytes contains the CAN bus speed in the third byte. The four lowest bits are the speed of the CAN #0 interface and the four highest bits contain the speed of the CAN #1 interface: 1 - 50 kbps, 2 - 125 kbps, 3 - 250 kbps, 4 - 500 kbps, 5 - 1000 kbps, 15 - interface not available. Other values are reserved, other bytes in the message are reserved and set to 255 (0xFF).

Record timestamps use the recording device's internal clock and may start at any value. The minute counter wraps to zero every 1024 minutes.

3rd party applications can add their own service records to the file. Yacht Devices reserves all service records with 'Y' in the first data byte for future file format extensions.

APPENDIX A. Support of .CAN format

The “Since” column lists the first version supporting CAN files. To add your product, contact us at www.yachtd.com/support/.

Product	Since	Description
Yacht Devices CAN Log Viewer	1.00	Views and plays CAN logs. Converts CAN to/from CSV and exports text or Voyage Recorder DAT files.
Yacht Devices YDVR Converter	1.20	Converts Voyage Recorder DAT files with NMEA 2000 data to GPX, spreadsheets and other formats, including CAN.
Yacht Devices NMEA 2000 Bridge	1.01	Records two CAN interfaces to .CAN files at 250 kbps.
Yacht Devices Voyage Recorder YDVR-03	1.20	Records NMEA 2000 data to DAT and plays CAN files onto a physical CAN network.
Yacht Devices Voyage Recorder YDVR-04	1.04	Adds CAN recording to YDVR-03 features; supports 50, 125, 250, 500 and 1000 kbps CAN networks.
Yacht Devices Engine Gateway YDEG-04	1.03	Records CAN files at 250 or 500 kbps.
Yacht Devices NMEA 2000 USB Gateway	1.00	CAN Log Viewer displays and records data from the serial port, configured for RAW or AUTO.
Yacht Devices NMEA 2000 Wi-Fi Gateway YDWG-02	1.00	CAN Log Viewer displays and records data from a TCP or UDP port configured for RAW.
Yacht Devices NMEA 2000 Wi-Fi Router YDNR-02	1.00	CAN Log Viewer displays and records data from a TCP or UDP port configured for RAW.
Yacht Devices NMEA 2000 Ethernet Gateway YDEN-02	1.00	CAN Log Viewer displays and records data from a TCP or UDP port configured for RAW.
Yacht Devices NMEA 0183 Gateway YDNG-03	1.00	Records CAN files at 250 kbps.

APPENDIX B. Firmware update support

CAN Log Viewer can update the following devices (see Chapter 4). Contact us at www.yachtd.com/support/ to add your product to this table.

Product	Date or version
Yacht Devices Digital Thermometer YDTC-13	Firmware 1.40 (Q2/2018)
Yacht Devices Humidity Sensor YDHS-01	Firmware 1.40 (Q2/2018)
Yacht Devices Digital Barometer YDBC-05	Firmware 1.40 (Q2/2018)
Yacht Devices Exhaust Gas Sensor YDGS-01	Any firmware, Q3/2018
Yacht Devices Circuit Control YDCC-04	Any firmware, Q4/2018
Yacht Devices Switch Control YDSC-04	Any firmware, Q4/2018
Yacht Devices Alarm Button YDAB-01	Any firmware
Yacht Devices NMEA 2000 Run Indicator YDRI-04	Any firmware
Yacht Devices Tank Adapter YDTA-04	Any firmware
Yacht Devices Outboard Gateway YDOG-01	Any firmware
Yacht Devices Autopilot YDAP-04	Any firmware (Q3/2023)