

USB-CAN TOOL DEBUGGING SOFTWARE USER Manual



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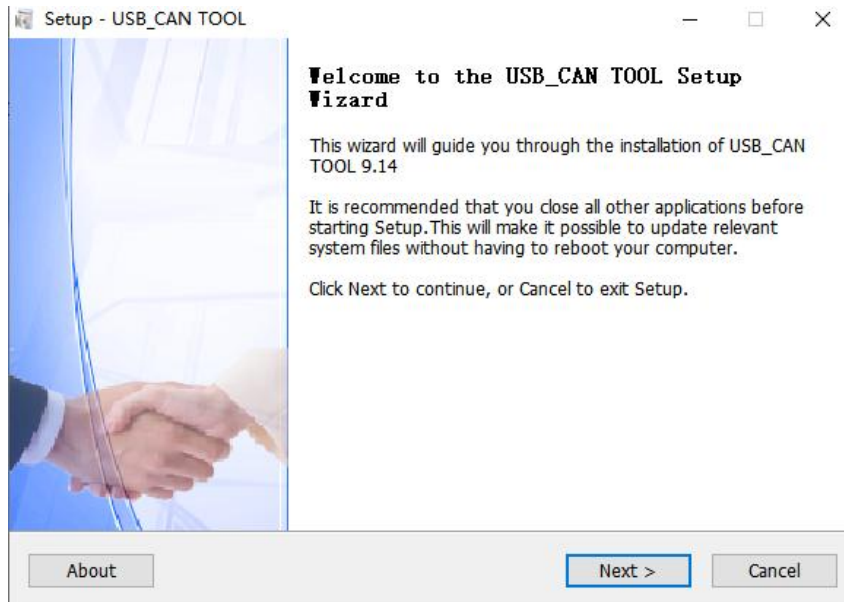
1. INSTALL SOFTWARE

1.1. USB-CAN SOFTWARE INSTALLATION

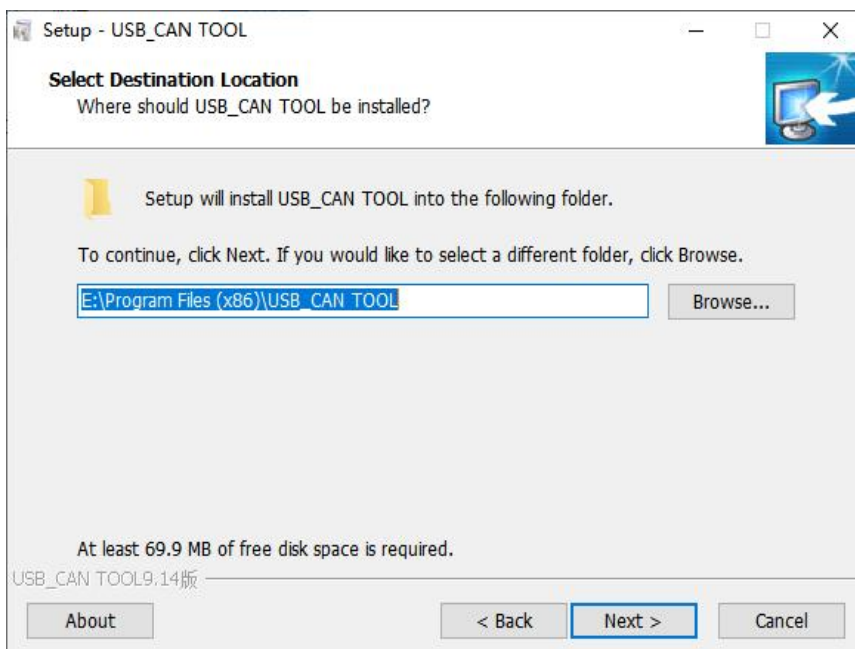
Directly run the CD or “CD or Network disk information\Debug Tool\Original factory debugging tools\USB-CAN TOOLSetup(V9.xx).exe”, and you can install it.

Run the installation package, and the interface shown in the following figure will appear.

Click “Next” to enter License Agreement User Interface Dialog Box.



Select the installation path and click “Next” to enter the installation component selection interface.



USB-CAN TOOL is the required option, checked by default.

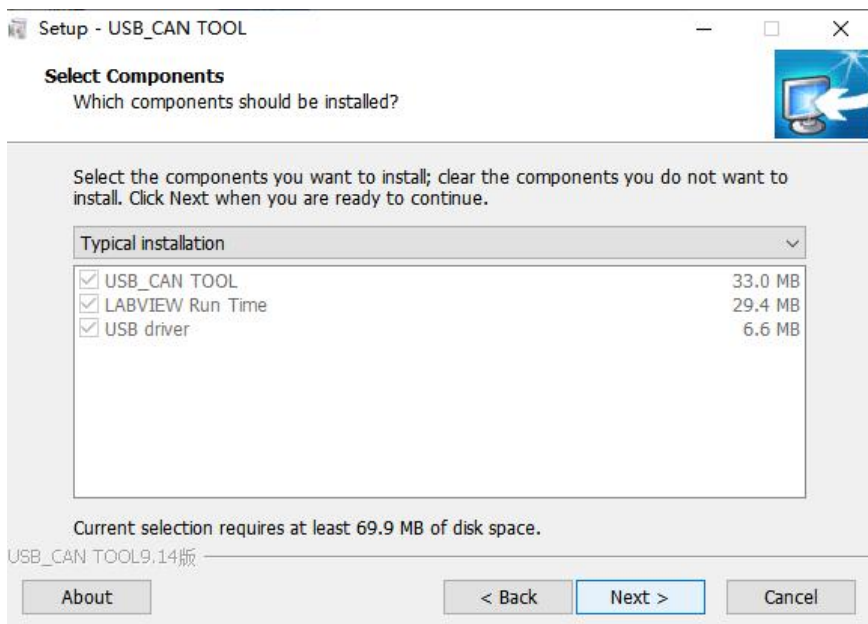
MS VC++ 2008 Redistributable: VC++ 2008 runtime library, most systems have been integrated, some systems are not installed, need to be installed.

LABVIEW basic operating environment: required for the first installation, this is the operating environment installation package required for applications developed based on the LABVIEW platform.

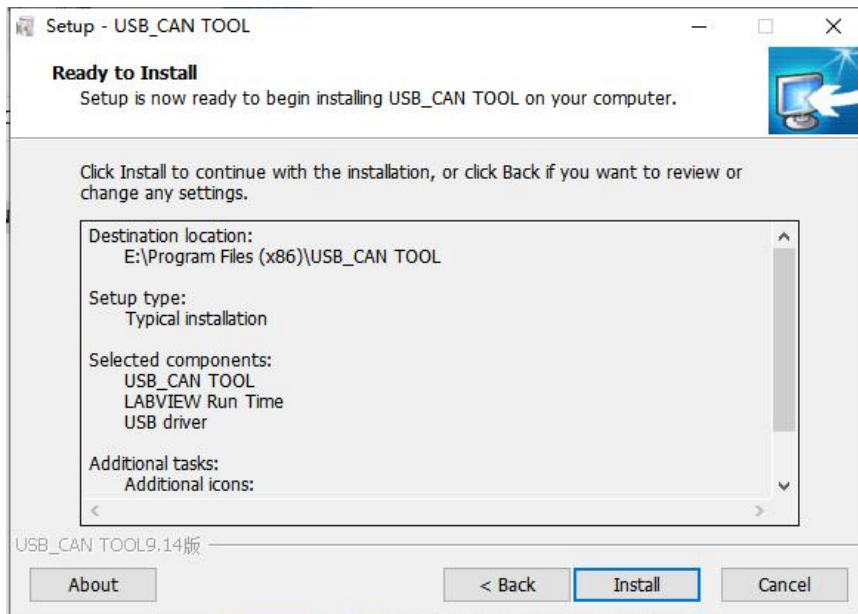
Install driver: USB driver.

Note: The system has all checked and will automatically install silently.

Select as needed and click "Next".

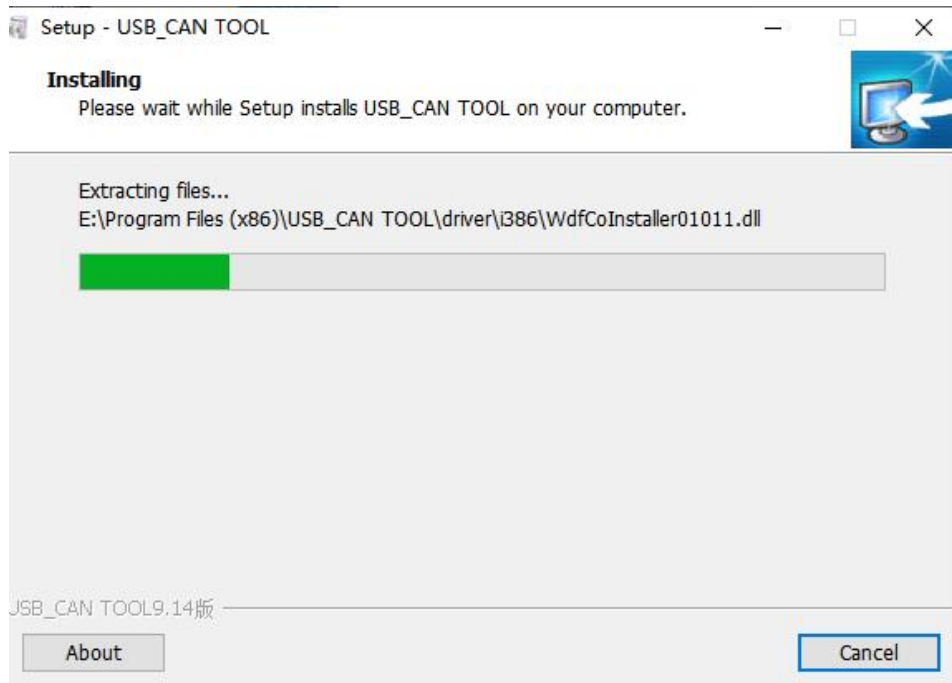


Click "Install". Begin to install the first USB-CAN TOOL software.

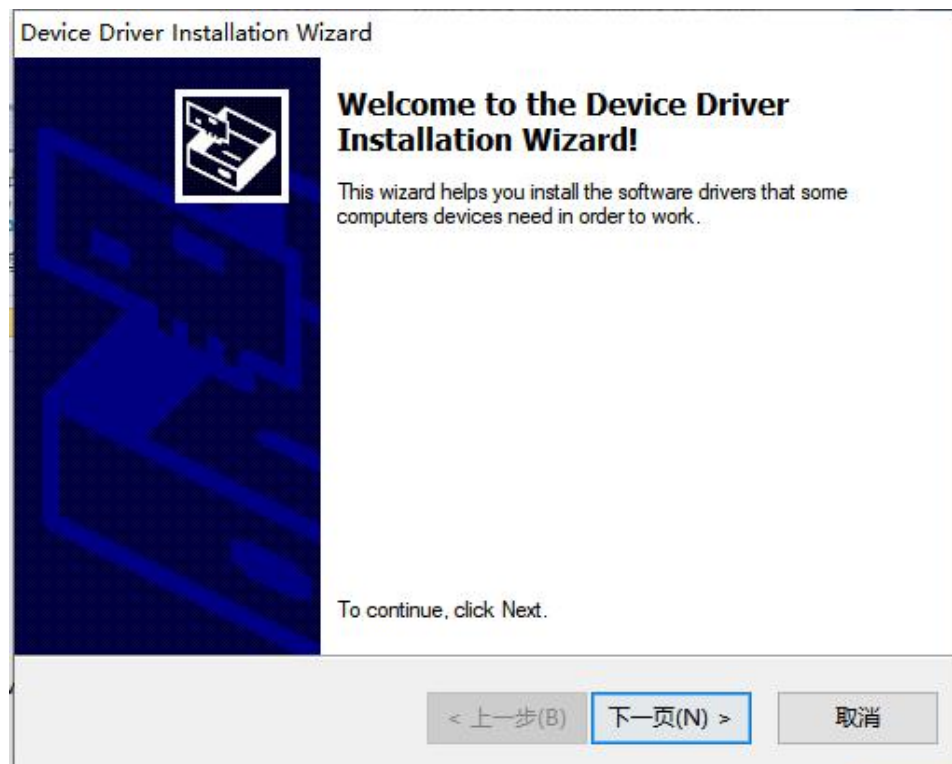


After the USB-CAN TOOL software is installed, it will directly enter the second item: MS VC++ 2008 Redistributable plugin installation.

Then it will install NI LabVIEW Run-Time Engine 2011 SP1 running environment.



Finally, click to install the driver and then close the software.



By now, the installation is finished.



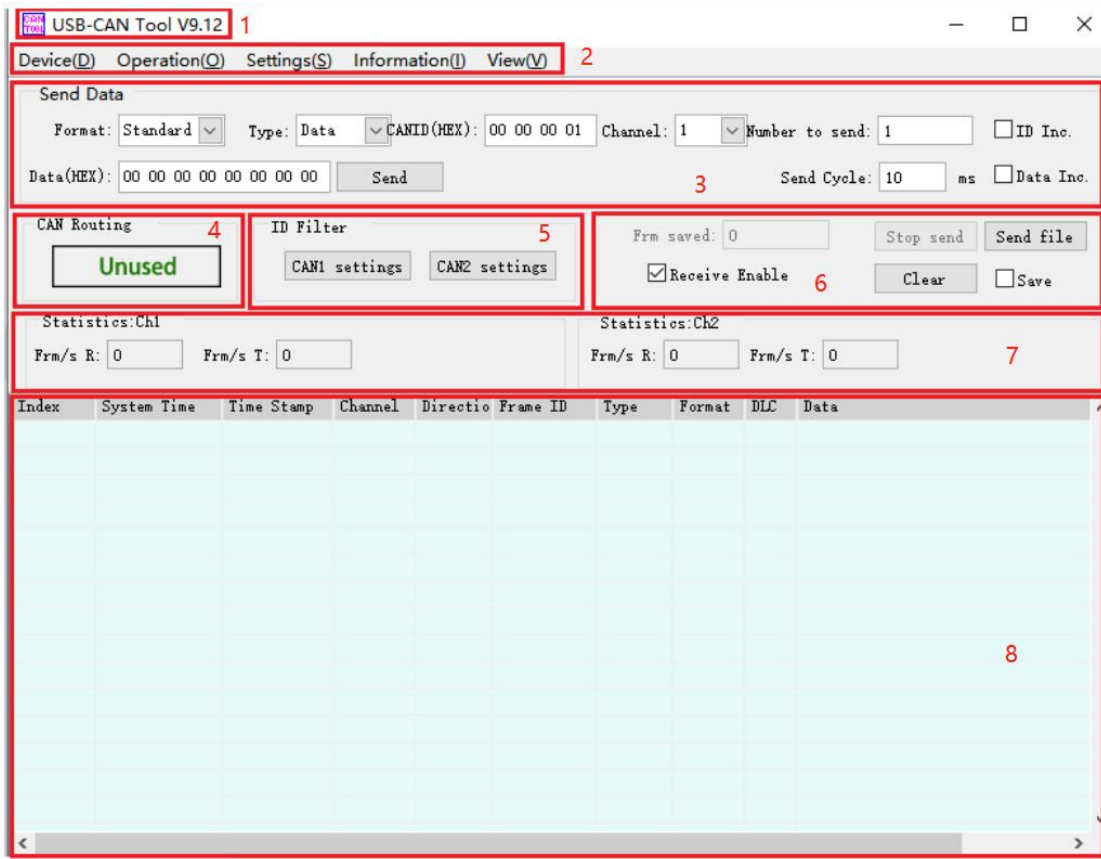
2. HOW TO USE USB-CAN TOOL

If a terminal resistor is required, please short-circuit R+ and R- with a wire for USBCAN, and for CANalyst-II analyzer, please turn the DIP switch to the ON position.

Note: There must be two 120 ohm terminal resistors on the normal CAN bus, otherwise it will affect the normal operation of the CAN bus.

Connect the device to the USB interface of the PC through a USB cable.

2.1. INTERFACE INTRODUCTION



2.1.1. TITLE BAR

When the device is turned off, USB-CAN Tool V9.xx will be displayed, where V9.xx represents the current program version number; when a USB-CAN adapter is successfully opened, the model, serial number, firmware version number, brand name will be appended to the above name.

2.1.2. MENU BAR

Most of the functions of this tool are in the menu, and the functions can be realized by clicking the corresponding menu.

2.1.3. SENDING SETTING SECTION

This section contains the setting information related to CAN information transmission, among which the "ID increment" function is that when sending multi-frame data, the ID value of the next frame of data is 1 greater than the ID value of the previous frame; The sent 8 bytes of data form a 64-bit number according to the byte order from low to high, and each time the data is sent, it is automatically incremented by 1. This function cooperates with the "receive incremental check" function to test the frame loss rate during high-speed transmission.

Note: This function is generally used for internal testing and is not recommended for users. When the data length is set to be less than 8 bytes, it will be automatically filled with 0 and filled to 8 bytes.

2.1.4. CAN RELAY

The CAN relay function is configured in the menu "Device Operation" -> "Relay Mode Options". When configured in relay mode, the relay status will be displayed here. If you want to turn off this function, you can close in the menu "Device Operation" -> "Relay Mode Options".

Note: After the relay function is enabled, the baud rate and other parameter settings are invalid, but the sending and receiving, and intelligent filtering functions can be used normally.

2.1.5. INTELLIGENT FILTERING FUNCTION

The two channels can be set separately, and the filter is only for reception. After enabling the filtering function, the ID in the filter list or the ID in the ID segment will be displayed and received, and the data outside the filter list will be masked and discarded. With flexible settings for intelligent filtering, any ID or ID segment can be allowed or blocked from being received.

2.1.6. CONTROL BUTTON

"Stop sending" - stop the current sending operation;

"Send file" - store the sent frame information in a file in a specific format, and send it in the order of the frames stored in the file;

"Open CAN reception" - the CAN receiving is enabled, otherwise the CAN receiving function is in the "suspended" state, at this time the host computer will no longer display the CAN bus data received by the USBCAN device, but the USBCAN device is still receiving the data on the CAN bus;

"Clear" - clear The contents of the current data list;

"Real-time storage" - saves the real-time data to a file.

Note: Sending a file may be consistent with the file format saved by the real-time storage function, and the saved file can be sent directly in the form of a file.

2.1.7. STATISTICS AREA

Includes one-way rate and receive incrementing parity error counters for channel 1 and channel 2. "Frame rate R" - receiving rate, unit: fps (frames per second); "frame rate T" - sending rate, unit: fps (frames per second); "Parity error" (internal functions are hidden by default) - — Receive data increment parity error counter, this value is the total number of dropped frames when receiving increment parity.

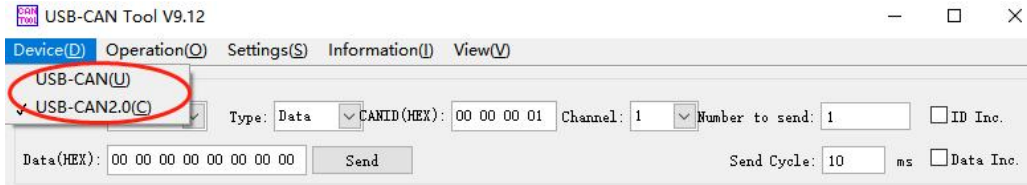
2.1.8. DATA LIST

The list for displaying the data sent and received.

2.2. OPEN AND CLOSE DEVICE

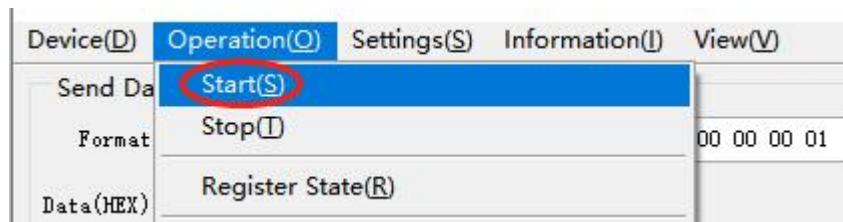
2.2.1. CHOOSE DEVICE MODEL

Select the corresponding device model in the "Device Model" drop-down menu in the menu bar, among which: "USB-CAN" is a single-channel USBCAN adapter, and "USB-CAN2.0" is a dual-channel USBCAN adapter. **All models of our company choose "USB-CAN2.0"**.



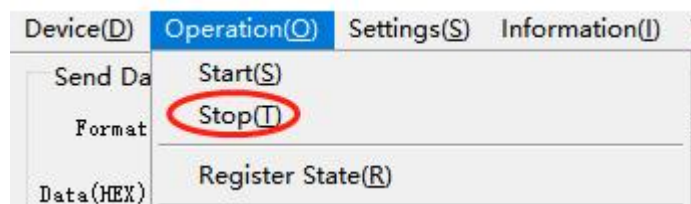
2.2.2. ENABLE USBCAN ADAPTER

Select "Startup Device" in the "Device Operation" drop-down menu in the menu bar, the program will automatically find and open the USB-CAN adapter.



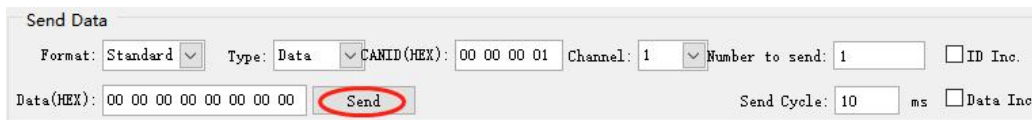
2.2.3. CLOSE USBCAN ADAPTER

Select "Close Device" in the "Device Operation" drop-down menu in the menu bar to close the USB-CAN adapter that has been opened.



2.3. SEND DATA

Set the sending conditions in the sending setting area: frame format, frame type, frame ID, CAN channel, total number of frames sent, whether the ID is incremented, whether the data is incremented, the sending period and data, and then press the send button to start sending. Here we will place great emphasis on the frame ID, total frames sent, ID increment, data increment and data.



2.3.1. FRAME ID

That is, the ID value of the CAN message frame. This tool adopts the **right-aligned method**. **The ID value is input in 4 bytes, expressed in hexadecimal, and the bytes are separated by spaces**. For example, when ID=0x18FF0023, the frame ID should be written as : "18FF 00 23".

2.3.2. SEND THE TOTAL FRAMES

Set the total number of frames sent this time, the value=-1 means that the number of frames to be sent is not limited (that is, continuous transmission), the value=0 is invalid, the value >=1 means the specific number of frames to be sent, and the number of frames to be sent will stop automatically when the number of frames reaches the set value.

2.3.3. ID INCREMENT

When the total number of frames sent is bigger than 1, if the ID increment item is checked, the currently sent frame ID value will add 1 to the previously sent frame ID value, such as ID sequence: "00 00 00 01", "00 00 00 02", "00 00 00 03"... (**right-aligned**)

2.3.4. DATA INCREMENT

When the total number of frames sent is greater than 1, if the data increment is checked, the data field value of 8 bytes is combined from low to high into a 64-bit unsigned number when sending, and the data is incremented by 1 each time. The first frame data is: "00 00 00 00 00 00 00 00", then the second frame data is: "01 00 00 00 00 00 00 00"... The 10th frame data is: "09 00 00 00 00 00 00 00", the 17th frame data is: "10 00 00 00 00 00 00 00"... and so on (**display mode: first low then high**).

Note: The above data fields are all represented in hexadecimal.

In the CAN send data input box, from left to right are the 1st to 8th bytes of the data field in the CAN message, for example: fill in "01 23 45 67 89 AB CD EF" in the input box, from low to high, the combined 64-bit unsigned number is 0xEFCDAB8967452301. In the CAN message list, first low and then high display: "01 23 45 67 89 AB CD EF" (default display mode); first high and then low display: "EF CD AB 89 67 45 23 01". (The mode can be displayed first under the display menu.)

2.3.5. ID

When filling in data, the low byte is on the left and the high byte is on the right. The CAN message data field contains up to 8 bytes of data, so the standard data filling format is 0 to 8 hexadecimal numbers separated by spaces (each maximum value of the number is 0xFF), **the length of the data field is automatically determined according to the number of bytes filled in; if the "Data Increment" option is checked, the length of the data field is locked to 8, if the number of bytes entered is less than 8, then it will be automatically filled with 0 to 8 bytes in the direction of the high byte.** For example, when the data is filled in as "12 34 56 78", it will be automatically added as: "12 34 56 78 00 00 00 00" (from low to high).

2.3.6. SEND FILES

Click "Send Document" as shown below, choose the document to send.



The format of the sent file is a csv file, and each row in the file contains one frame of data and contains 10 elements:

1. Serial number: start from 0.

2. System time: Real-time storage of saved files, PC clock displayed by system time, when sending files, they will be sent at system time intervals. When there is no system time, it will be sent with the setting value of the sending cycle on the interface.

3. Time stamp: Real-time storage of the saved file, the time stamp indicates the exact time of reception, the power-on time is the starting point, and the unit is 0.1ms. For sending, it is invalid.

4. CAN channel: Real-time storage of the saved file, there is an indication of the CAN channel, which is invalid for sending.

5. Transmission direction: Real-time storage of saved files, indicating the transmission direction, is invalid for sending.

6. ID: beginning with 0x, expressed in hexadecimal.

7. Frame type: data frame/remote frame.

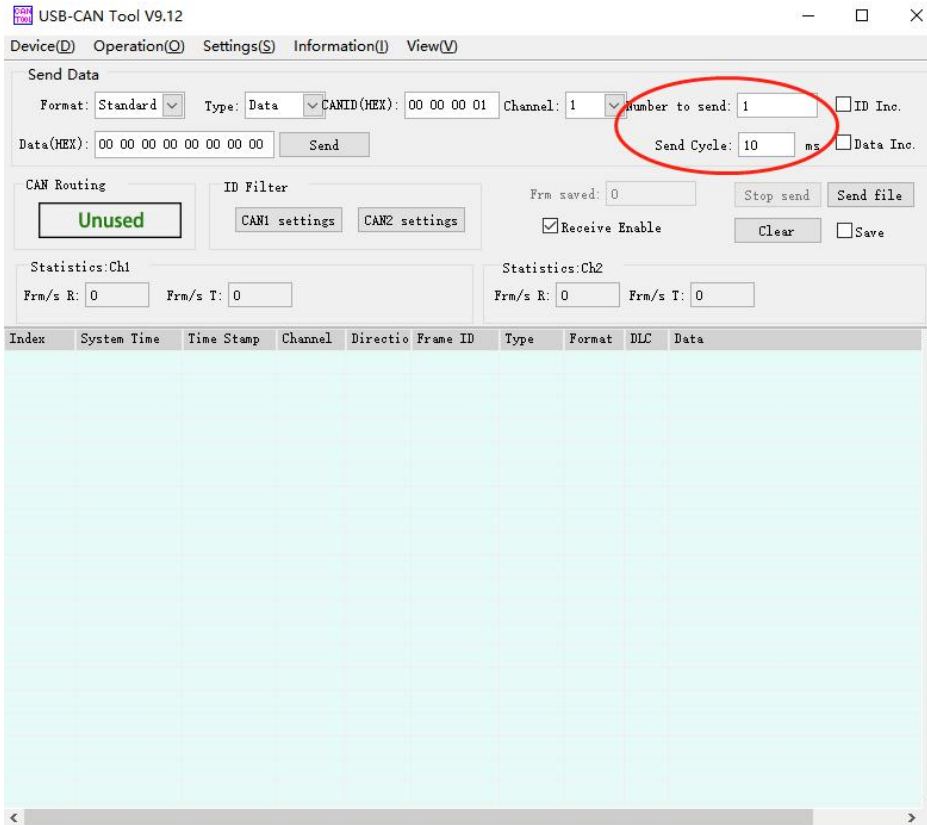
8. Frame format: standard frame/extended frame.

9. Length: start with 0x, expressed in hexadecimal. 1-8 bytes.

10. Data: starting with x|, expressed in hexadecimal. 1-8 bytes.

Note: For the specific sample list, check the CD "Data CD\Secondary Development Example Source Code\Example For Send File.csv"/or the software installation directory: "C:\Program Files (x86)\USB-CAN TOOL\ Example For Send File.csv". You can also store a file in real time and then modify it on the file.

6. When sending files, the sending cycle of the main interface of the software is valid and needs to be configured as needed.

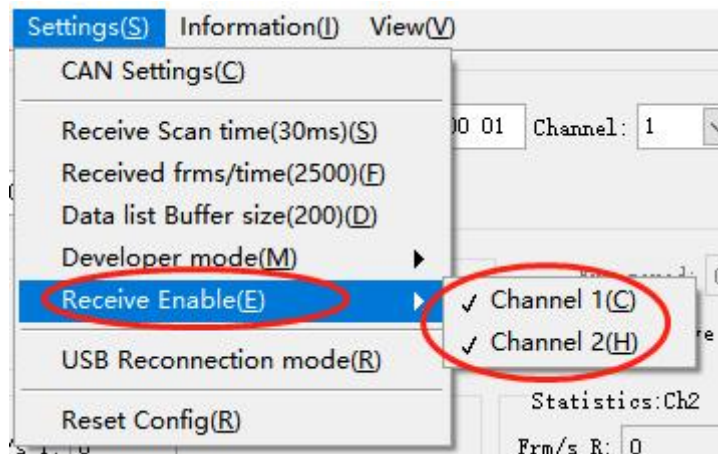


2.4. RECEIVE MESSAGE

After checking the "Open CAN Receive" option, it starts to receive data on the specific channel of the enabled USBCAN adapter.



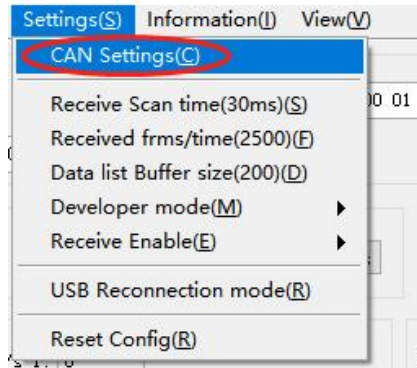
You can choose the reception of channel 1 and channel 2 through the "Enable Reception" in the "Parameter Setting".



2.5. CAN PARAMETER

2.5.1. SET CAN PARAMETER (INTERNAL FUNCTION)

When the USBCAN adapter is turned on, click the menu item "parameter setting" -> "CAN parameter setting" to enter the USBCAN adapter parameter setting interface.



Each channel of the USBCAN adapter has a set of independent parameters, which can be set and run independently. In the parameter setting interface, select "CAN channel" to change the current target channel parameters to be modified:

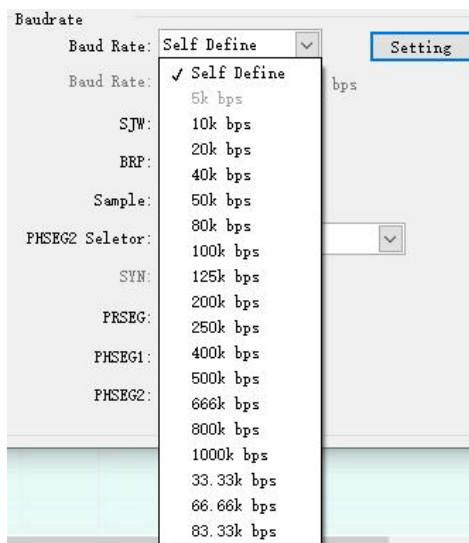
Note: This function is an internal function. When users configure parameters, they can directly configure parameters such as bit filter rate in the menu "Device Operation" -> "Start Device" interface.

2.5.1.1. BAUD RATE SETTING

The baud rate parameter drop-down list provides standard baud rate settings from 10k to 1000k, and provides unconventional baud rate setting methods. Select "self define" in the list, and set the baud rate register value.

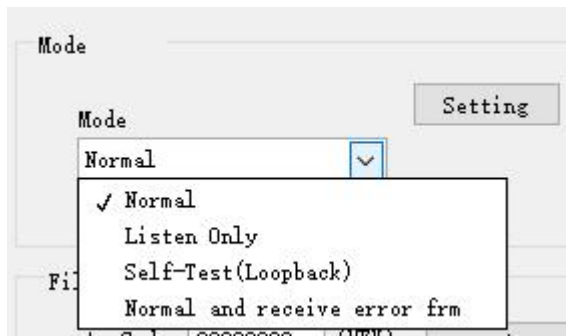
Among them, the calculation formula of baud rate is:

$$\text{CAN baud rate} = \frac{16000000}{(\text{sync segment} + \text{propagation time segment} + \text{phase buffer segment 1} + \text{phase buffer segment 2}) / \text{prescaler}}$$



2.5.1.2. WORKING MODE

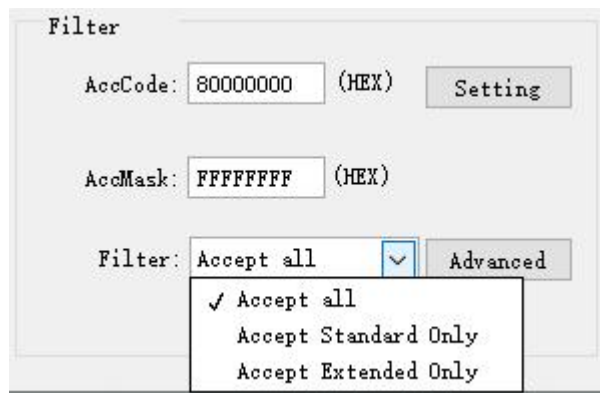
Normal operation mode, monitor-only mode and self-test mode (loopback mode) can be selected:



2.5.1.3. FILTER SETTING

When the module receives a message, it compares the message identifier with the corresponding bits in the filter. If the identifier matches the user-configured filter, the message is stored in the corresponding receive buffer queue of the CAN controller.

The Acceptance Mask register can be used to ignore selected bits of an identifier when receiving. When the message is received, these bits will not be compared with the bits in the filter. For example, if the user wishes to receive all packets with identifiers 0, 1, 2 and 3, the user needs to mask out the lower 2 bits of the identifier.



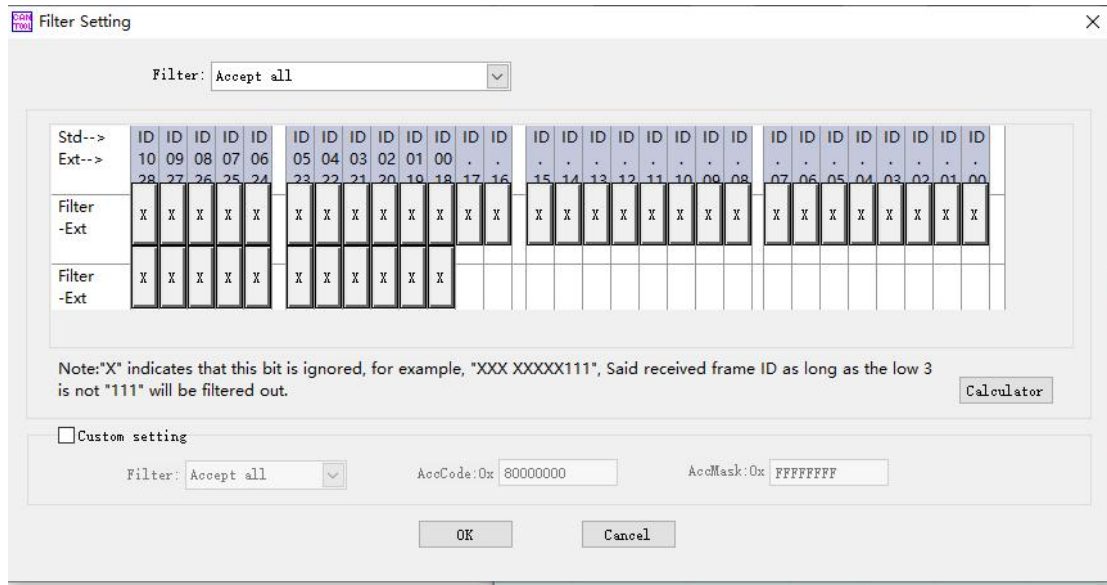
The USB-CAN bus adapter provides 3 filtering methods, the descriptions are shown in the following table:

Value	Name	Description
3	Receive all models	Filtering standard frames and expanded frames at the same time!
4	Only receive standard frames	Only filtering the standard frames and the expanded frames are filtered out.
7	Only receive expanded	Only filtering the expanded

	frames	frames and the standard frames are filtered out.
--	--------	--

Note: for a detailed description of the baud rate, working mode, filtering and other settings, please refer to the documentation of "9. Annex 2: CAN Parameter Setting Instructions".

Click the "Advanced Setting" in the filtering setting area to enter the "Advanced Setting" as shown below:



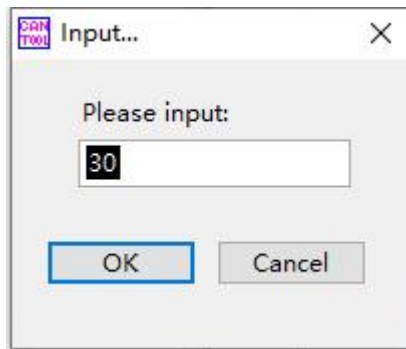
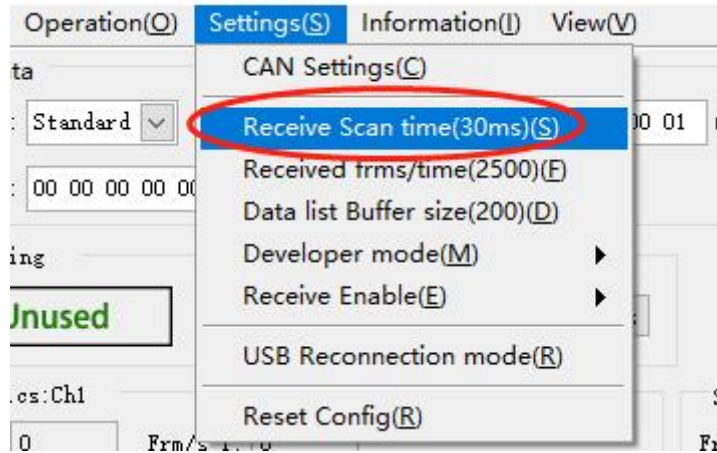
Users can customize the filter settings in this interface, more convenient!

2.6. OTHER SETTING

2.6.1. RECEIVING SCANNING TIME

Click the menu item "Parameter Setting"->"Receive Scan Time (xx ms)" to modify the minimum scan period of CAN reception, where xx represents the currently set scan period in milliseconds.

Receive scan period, the default (best value) is 30ms.

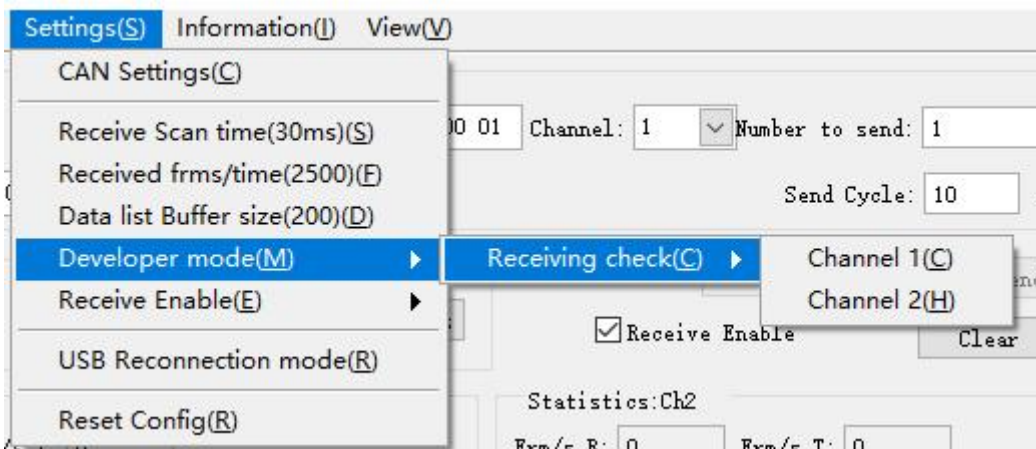


2.6.2. INCREMENT PARITY

Click the corresponding menu item in "Parameter Setting"->"Receive Incremental Calibration" to enable or disable "Channel 1" or "Channel 2"

The received data incremental parity function, this function is used in conjunction with the "data incremental" function when data is sent, and is often used for high-speed reception.

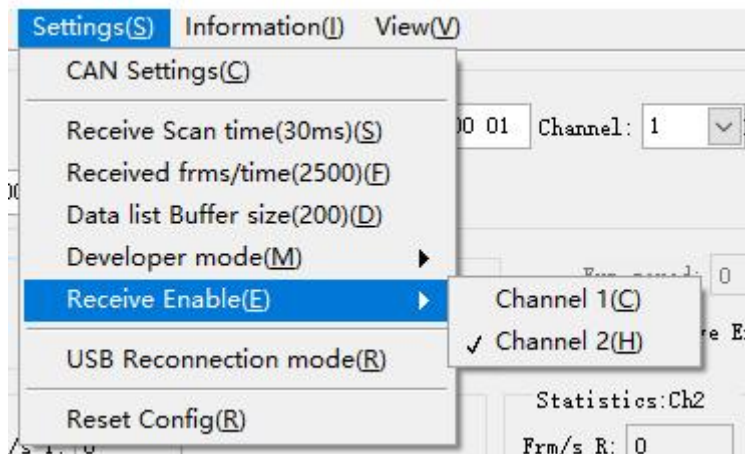
Frame loss test when sending CAN messages.



2.6.3. ENABLE CHANNEL

Click "Parameter Setting"->"Enable", and choose the corresponding option, enable or

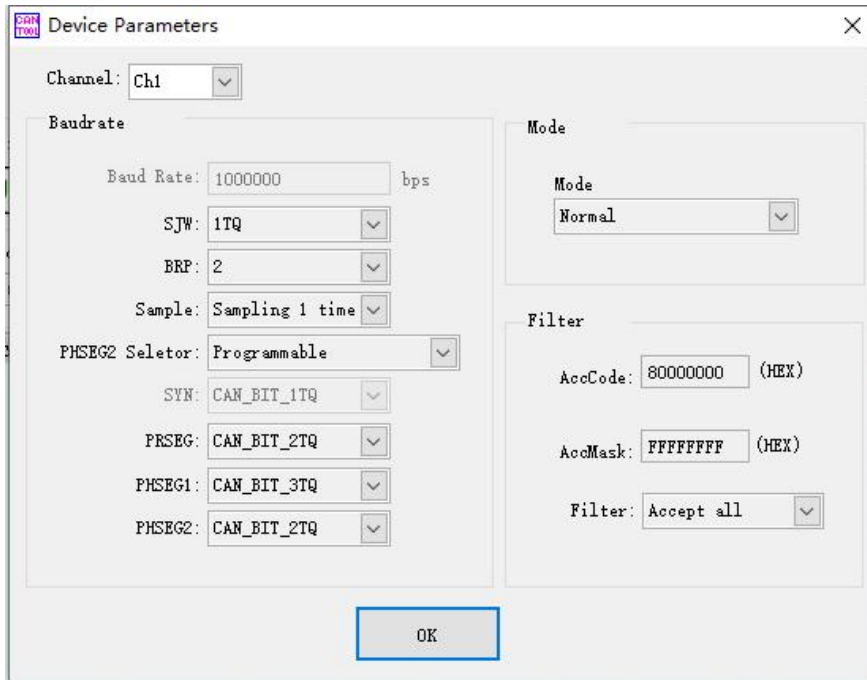
disable the receiving function of Channel 1 and Channel2.



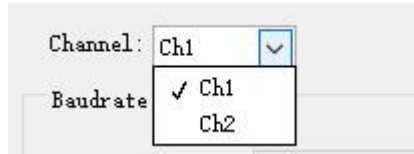
2.7. MESSAGE

2.7.1. CURRENT PARAMETER

Click to choose "Message"->"Current Parameter" to get the current parameter of the USBCAN adapter.

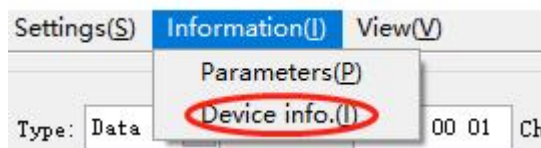


When the device type is USB-CAN2.0, you can select to check the parameters of other channels through "CAN Channel".

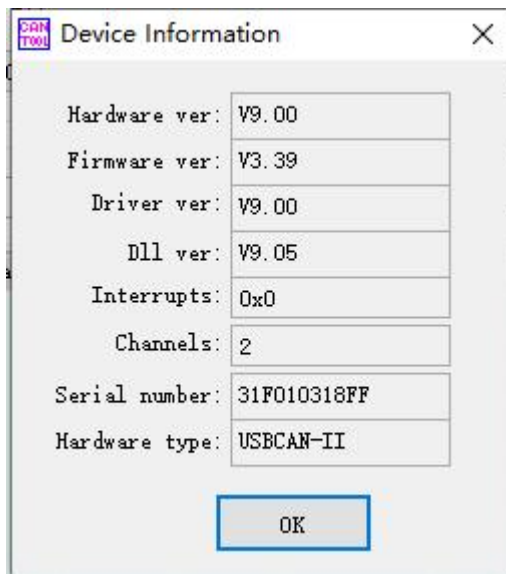


2.7.2. DEVICE INFORMATION

Click to choose "Message"->"Device Information" to open the device information window.



This window displays the detailed information of the current USBCAN adapter.



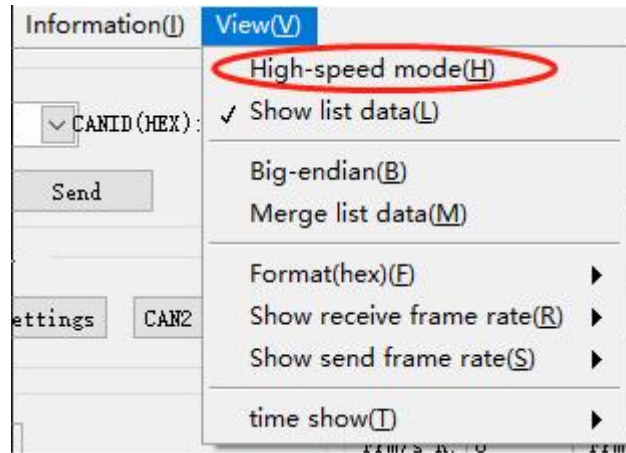
2.8. DATA DISPLAY

2.8.1. HIGH-SPEED MODE (INTERNAL TESTING)

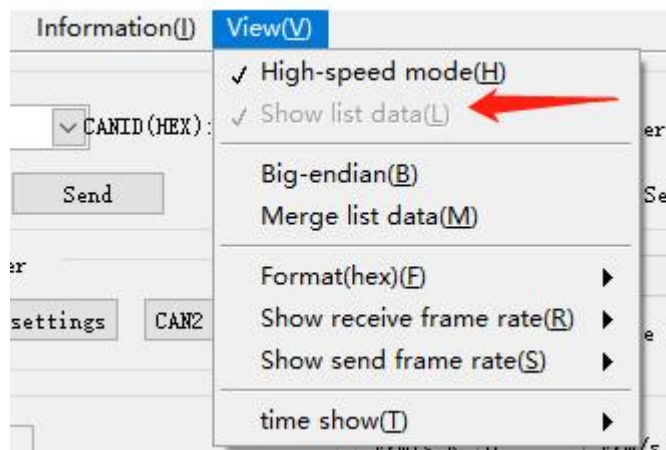
Click the menu item "Display"->"High-speed Mode" to open or close the high-speed mode of information display. When the high-speed mode is turned on, the two functions of "list data" display and "information storage" will be invalid. This function is generally used for high-speed Transceiver test.

Note: When the sending and receiving frame rate of the USBCAN adapter is high (such as 8000 frames/second), the general list display will be relatively slow and occupy computer

resources and affect the sending and receiving efficiency of the USBCAN adapter. The tool will only process data reception, data transmission, and data verification, and no longer process time-consuming operations such as data display and data storage!



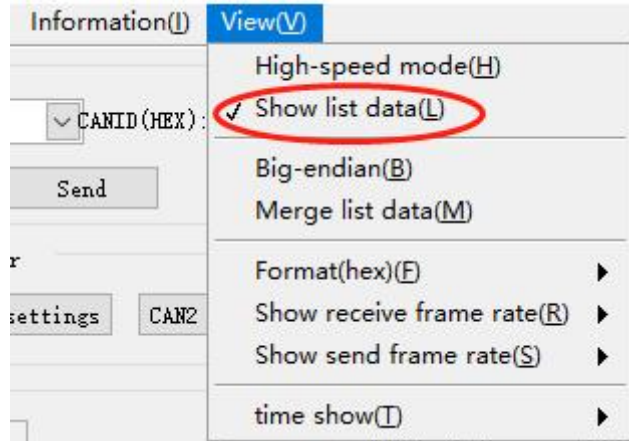
The following diagram illustrates how the related items are disabled when high-speed mode is enabled:



2.8.2. DATA LIST

Click the menu item "Display" -> "List Data" to enable or disable the display of CAN messages in the data list. Displaying real-time messages in the data list will affect the processing speed of CAN messages by the software to a certain extent.

Note: When "High Speed Mode" is turned on, this function is invalid!

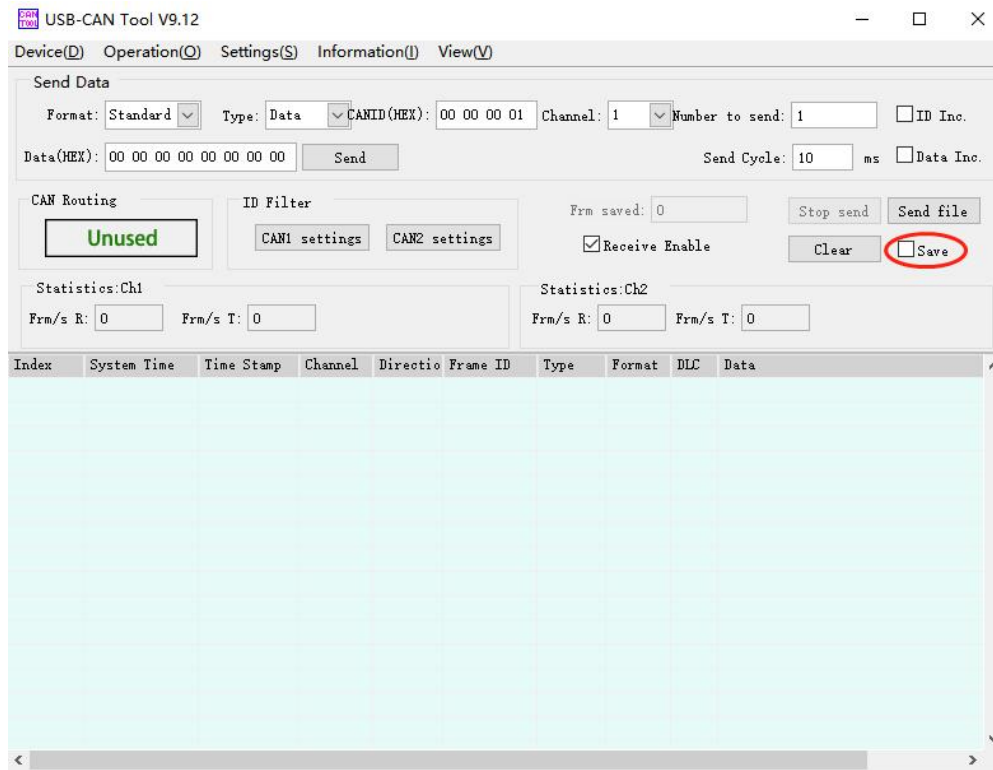


2.8.3. MESSAGE REAL-TIME STORAGE

Check the "Real-time storage" box in the software interface to choose whether to store the real-time message in the Excel. When the information real-time storage function is enabled, a dialog box of "File Save Path Selection" will pop up, asking the user to select the storage directory and file name of the file to be stored.

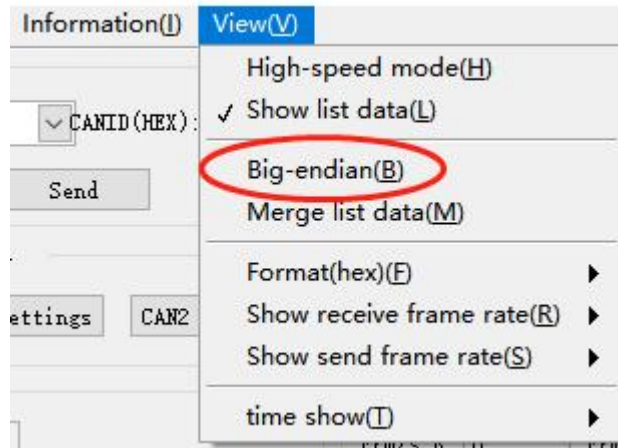
When the information is stored in real time, "_xxx" will be added to the file name selected by the user, where xxx is the sub-file serial number, 000 is the first sub-file, 001 is the second sub-file, and so on. 10000 frames of data are saved in each subfile.

Note: When "High Speed Mode" is turned on, this function is invalid!



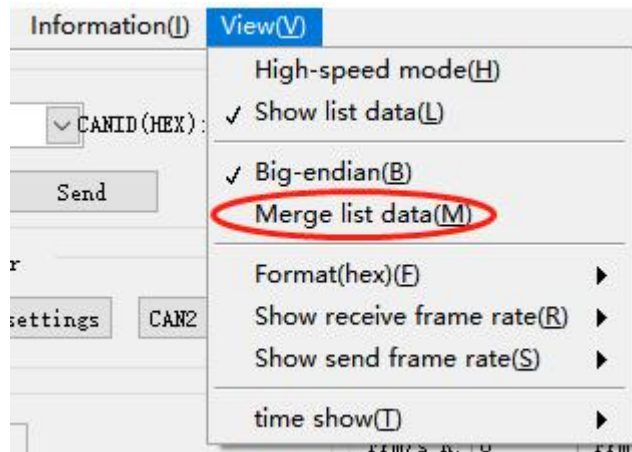
2.8.4. BYTE ORDER

Click "Display"-> "From high to low", and then the list will display the byte order.



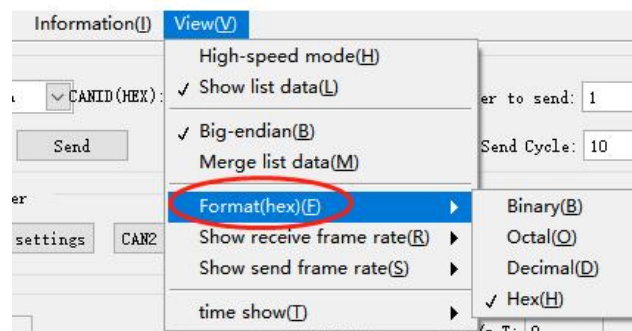
2.8.5. MERGE SAME ID DATA

Click "Display"->"Data Format (xxx)" and the corresponding options to change the current data format in the CAN data list. The optional format includes: Binary, Octal, Decimal, Hexadecimal, where xxx is abbreviation for the current format.



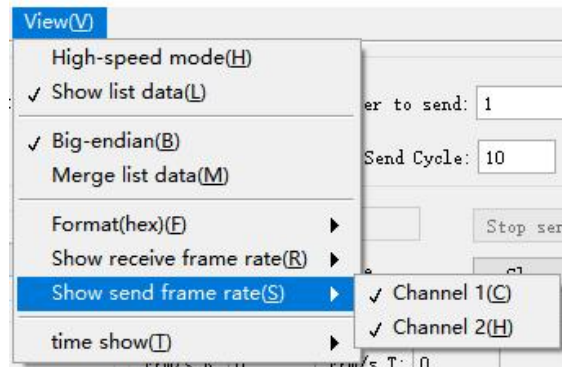
2.8.6. DATA FORMAT

Click the corresponding item in the menu item "Display"->"Data Format (xxx)" to change the data display format in the current CAN message list. The optional formats are: binary, octal, decimal, hexadecimal, among which xxx indicates the abbreviation of the current format.



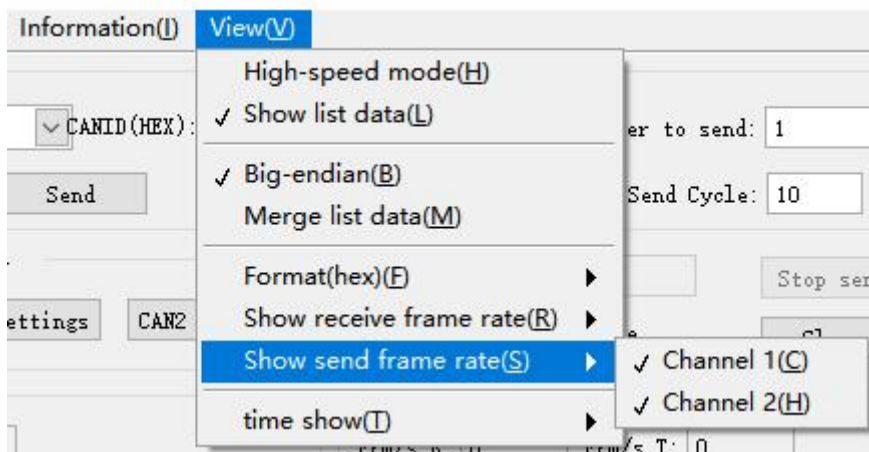
2.8.7. RECEIVING FRAME RATE DISPLAY

Click the channel number in the menu item "Display"->"Display RX Frame Rate" to turn on or off the display of the RX frame rate.



2.8.8. SEND FRAME RATE DISPLAY

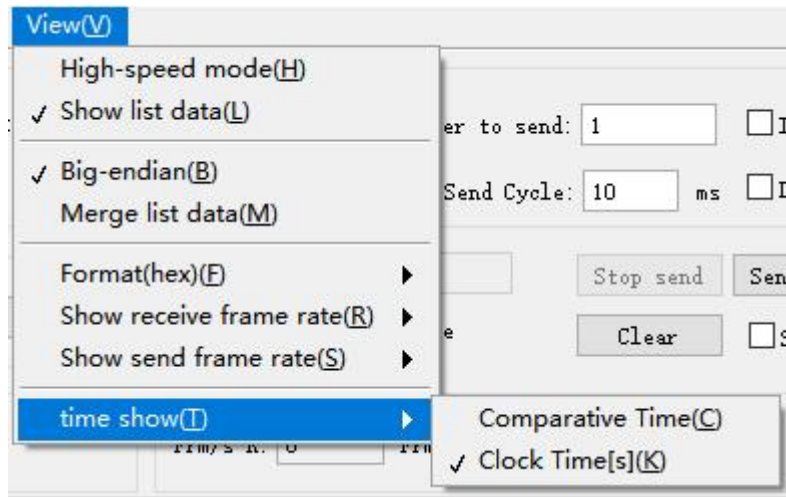
Click the channel number in the menu item "Display"-> "Display Send Frame Rate" to turn on or off the display of the send frame rate.



2.8.9. TIME STAMP FORMAT

The time stamp refers to a time stamp on each received frame of data, which records the exact time when the USBCAN device receives the data of the frame, which starts from the time when the USBCAN device is initialized. It is generally used in occasions such as precise drawing of the time axis.

Click "Display" -> "Time Stamp Format" menu item, select the time stamp format as original value or actual value. The unit of the actual value is: 1s. The original value unit is 0.1ms.



2.9. DATA RECEIVING SOFTWARE FILTER

In the receive filter ID setting area, click Enable, modify the receive filter ID value, and after **setting**, open the receive filter setting, this function compares the CAN message frame ID read from the USBCAN adapter with the set filter ID group, if it is allowed to receive, it will be displayed and processed, otherwise it will be discarded.

Multiple ID values allowed to be received can be set in hexadecimal, separated by spaces, for example: if the receiving ID is set to "18FF05C8 03 9C8", it means that the USB-CAN Tool only processes CAN messages with ID=0x18FF05C8, 0x03 and 0x9C8 frames, all received frames with other IDs are ignored.



2.10. DATA DISPLAY LIST

When the "List Data" menu is checked and not in "High Speed Mode", the data display list will display the content of CAN messages being received and sent in real time.

Index	System Time	Time Stamp	Channel	Directio	Frame ID	Type	Format	DLC	Data
00000	19:03:07.193	-	ch1	Send	0x0001	Data	Standar	0x08	x 00 00 00 00 00 00 00
00001	19:03:07.207	0x169860EC	ch2	Receive	0x0001	Data	Standar	0x08	x 00 00 00 00 00 00 00

2.10.1. SEQUENCE NUMBER

The position of the CAN message in the information buffer, starting from 0, and a maximum of 100,000 frames of data can be stored in the data buffer.

2.10.2. SYSTEM TIME

The system time when the CAN message was sent or received is obtained from the computer.

2.10.3. TIME STAMP

The hardware time when the CAN message is received, unit: seconds, the time starts from the time the USB-CAN device is started, with an accuracy of 0.1 milliseconds. (Click the menu item "Display"->"Time Stamp Format", and select the time stamp format as original value or actual value. The unit of the actual value is: 1s, and the unit of the original value is 0.1ms.)

2.10.4. CAN CHANNEL

The channel number of the CAN device used when sending or receiving CAN messages, ch1 means channel 1, ch2 means channel 2.

2.10.5. TRANSMISSION DIRECTION

Marks whether CAN messages are sent or received.

2.10.6. ID NUMBER

ID value of CAN message. For the introduction of ID, please refer to: "Attachment 1: Detailed Description of ID Alignment".

2.10.7. FRAME TYPE

Marks whether the CAN message is a data frame or a remote frame.

2.10.8. FRAME FORMAT

Marks whether the CAN message is a standard frame or an extended frame.

2.10.9. LENGTH

Data length of CAN message, unit: byte.

2.10.10. DATA

Data for CAN messages. For the display method of data, please refer to Section 2.8.4 Byte Order and Section 2.8.6 Data Format.

2.11. OTHER FUNCTION

2.11.1. CONFIGURATION INFORMATION AUTOMATICALLY SAVED

After the software runs, it will automatically load the interface state at the end of the last time, including menu item settings, interface control values, etc.