

ECANTools

CAN debugging software

User Manual

Document version: V5.67 (2017/09/01)

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1. Software features and function description

1.1 Abstract

ECANTools is the software of USBCAN which are designed and developed by Shenyang Guangcheng Technology Co., Ltd.. ECANTools software has a lot of functions, such as data transmission and reception, data saving, automatic recognition of baud rate, statistics mode, senior shielding. ECANTools also supports car OBD analysis functions and CANopen master station. ECANTools supports standard system in WIN XP/WIN7/WIN8/WIN10.

The applicable converter models of ECANTools are USBCAN-I Pro, USBCAN-II Pro, USBCAN-OBD, USBCAN-Mini, ECAN-Pro, CANCore.

1.2 Functional description

- Data transmit and receive
- Automatic recognition of baud rate
- Read gasoline car OBD real-time information
- CANopen master station
- Filter and ID shield
- Real-time save and data broadcast
- Statistics mode

2. Installation and start

2.1 Installation

ECANTools software installation package contains driver setup. Connect the USBCAN to PC after installation, the system will automatically identify the converter.

2.2 System requirements

ECANTools supports 32 bit and 64 bit Windows XP/Win7/8/10 systems.

2.3 Start ECANTools



Click on the icon, then ECANTools will be started.

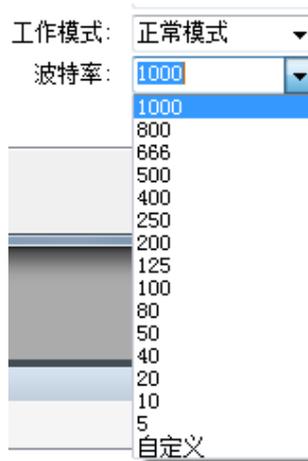
3. Connection and use

3.1 Start

After Installing Windows driver, connect the USBCAN to PC and start the software as shown in the following figure.



- ①Select device type:V306/401 version select V4, **V405/502 version select V5**
- ②Open the device: Click the button and ③ will be displayed
- ③Device display window: it will display the SN of the device
- ④Channel selection: select and set the CAN-Bus parameter
- ⑤Working mode: normal mode, listen mode and loopback mode, usually selecting normal mode
- ⑥Baud rate selection: select the correct baud rate as below



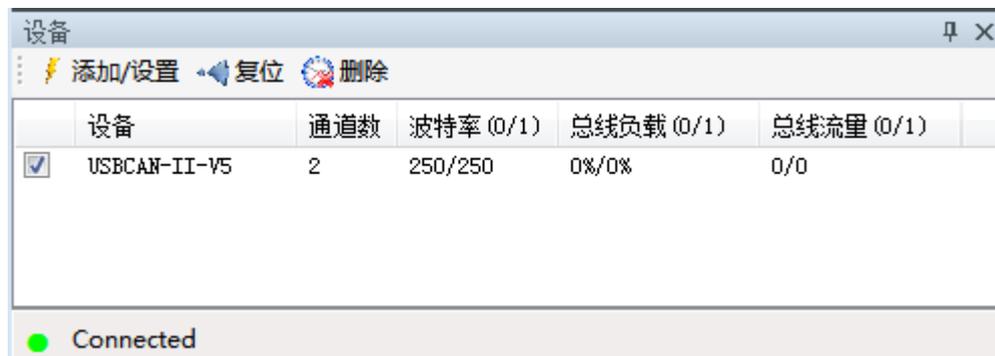
If you need the special baud rate, please choose user-defined. Some special baud rate values are shown in the following table.

Baud rate	Parameter
83.3kbps	27C017
66.6kbps	2DC013
60kbps	2BC018
35kbps	2EC023
33.3kbps	2EC025
25kbps	2FC02F
12kbps	2BC07C

⑦ Automatic identification of the baud rate

⑧ Confirm button: after selecting the baud rate, click the button and open the software.

Then the SYS indicator light of the device will be blinking. After the successful connection, the parameter of CAN-Bus will be shown as below:



3.2 Automatic identification of the baud rate

If users don't know the baud rate, you can choose automatic identification of the baud rate. There are two modes of the function, silent mode recognition and enhanced mode recognition. The environment for silent mode recognition requires active CAN data on the bus. The CAN-Bus has at least two devices under test and can communicate with each other normally. The environment for enhanced mode recognition are the CAN device must be powered on and the CAN channel is working properly. It does not require the device to actively send CAN data, nor does it require active CAN data on the bus. Please make sure the connection is correct and two 120 ohms resistance is on the CAN-Bus.

Please note that for the CAN-Bus system of the car, please select "silent mode recognition" to identify the baud rate. Using "enhanced mode recognition" may result in vehicle instrument error reporting.



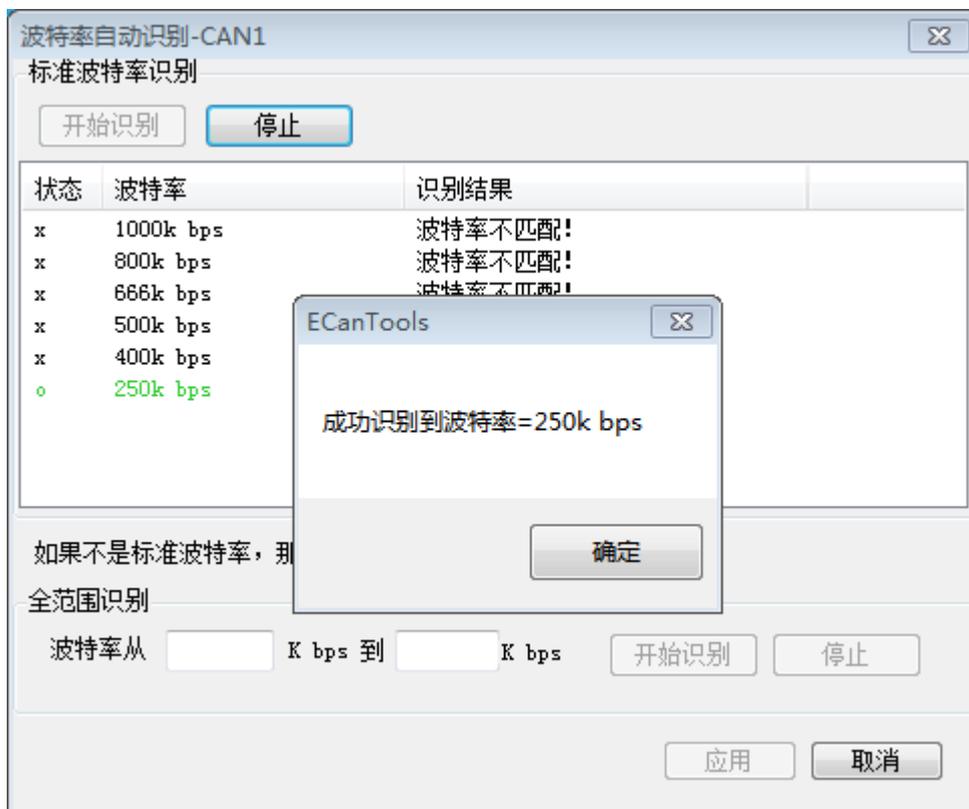
There we use USBCAN-II Pro to detect unknown baud rate of other equipment. The wiring method is CANH to CANH, CANL to CANL and the resistance dial switch has been switched down. Then open ECANTools.

The baud rate automatic recognition function is divided into two modes:

- A. Standard baud rate identification
- B. Full range baud rate identification

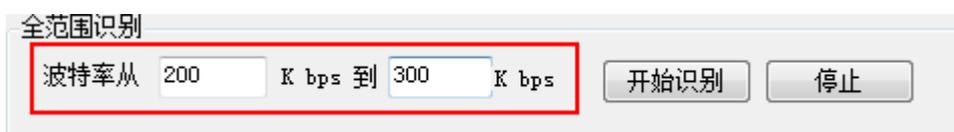
A. Standard baud rate identification

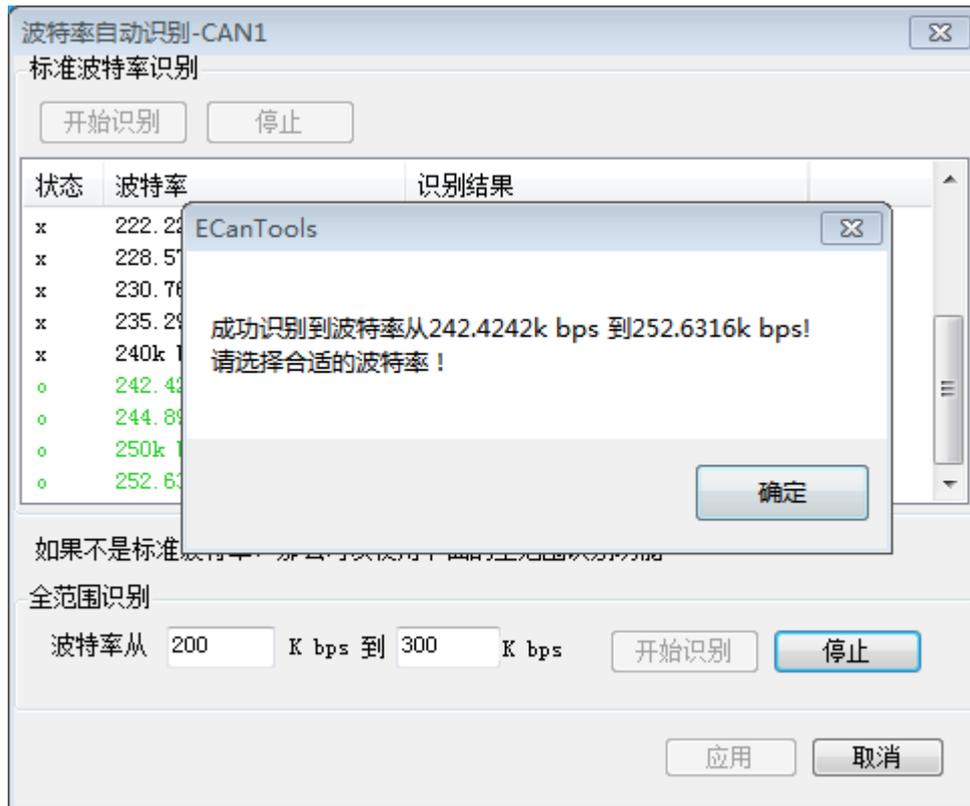
The user can identify the standard baud rate such as 1000k, 800k, 666k, 500k, 250k and so on.



B. Full range baud rate identification

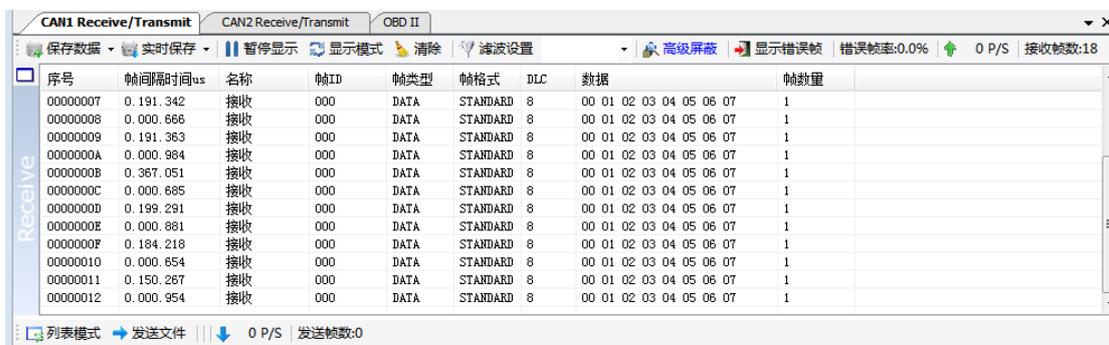
If the unknown equipment's baud rate is not standard, users can use the full range baud rate identification which is all baud rate in the user selection range.



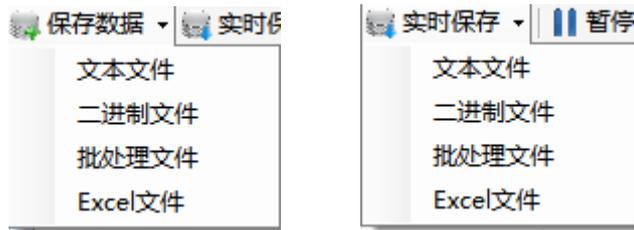


3.3 Data reception

If there is data on the bus, the receive data window will have data displayed as below.



3.3.1 Saving and real-time saving



The user can save all the data in the current transmit/receive list to the local PC. The format of the data is shown in the following table:

File type	File format	Editor
Text file	.txt	Notepad
Binary file	.dat	Notepad
Batch file	.can	Notepad
Excel file	.csv	WPS Excel

Text files are convenient for data storage and analysis. Batch files can be modified and sent back to the bus via Notepad. The description of batch file formats is detailed in chapter 3.4.3.

Click on the button in the toolbar to start saving data in real time. Click again, the system will stop saving and write all the data from the beginning (A) to the end (B) to the save file.

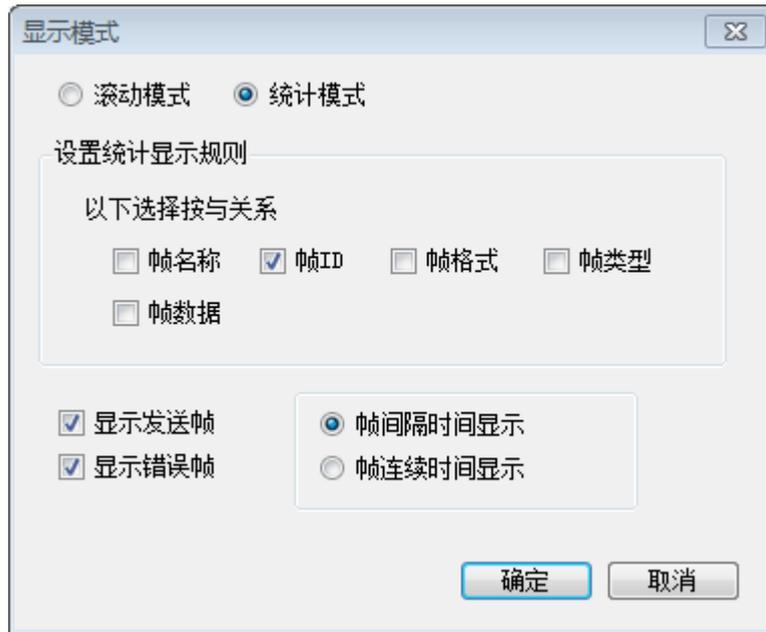
3.3.2 Pause display function



Click pause, you can pause the data window. Software can still receive data, but the data window will not be refreshed. Click continue to display, you can see it scrolling again.

3.3.3 Display mode

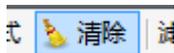
Display modes include scroll mode and statistics mode:



Statistics mode is classified display according to set rules, such as frame ID, frame name etc.

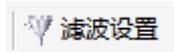
序号	帧间隔时间us	名称	帧ID	帧类型	帧格式	DLC	数据	帧数量
00000000	0.000.937	接收	000	DATA	STANDARD	8	00 01 02 03 04 05 06 07	38

3.3.4 Eliminate function



Empty data from the receive / send window.

3.3.5 Filter setting



The receive filter setting can set the filter ID or ID range. If the filter is set, the software will only display the filtered ID range and the ID that is not in the filter range will be filtered out.

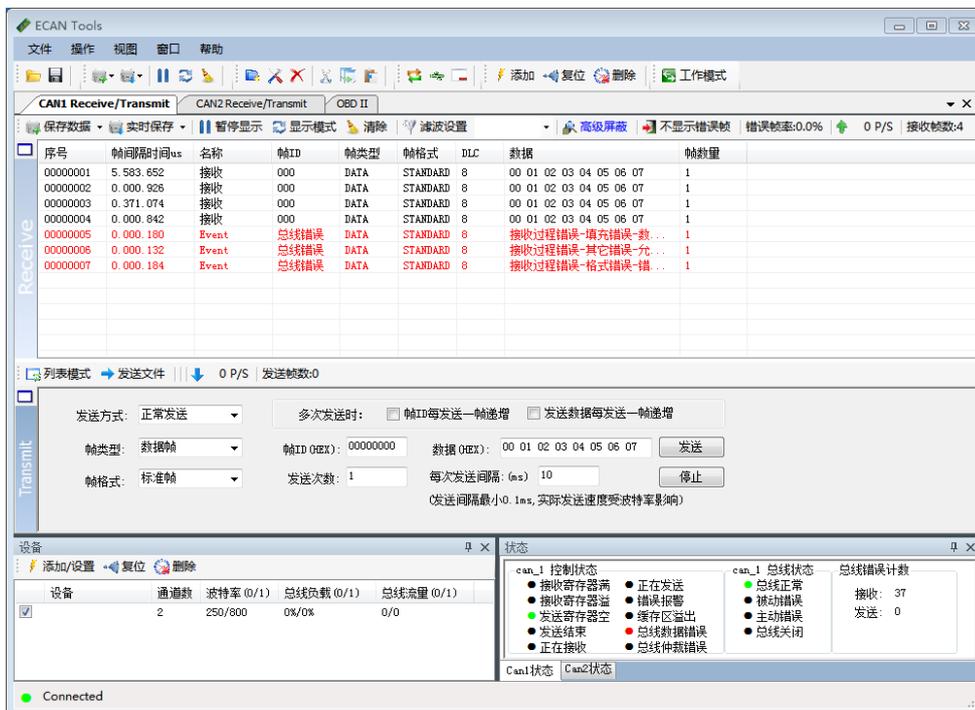
Click the edit filter, you can set the filter range:



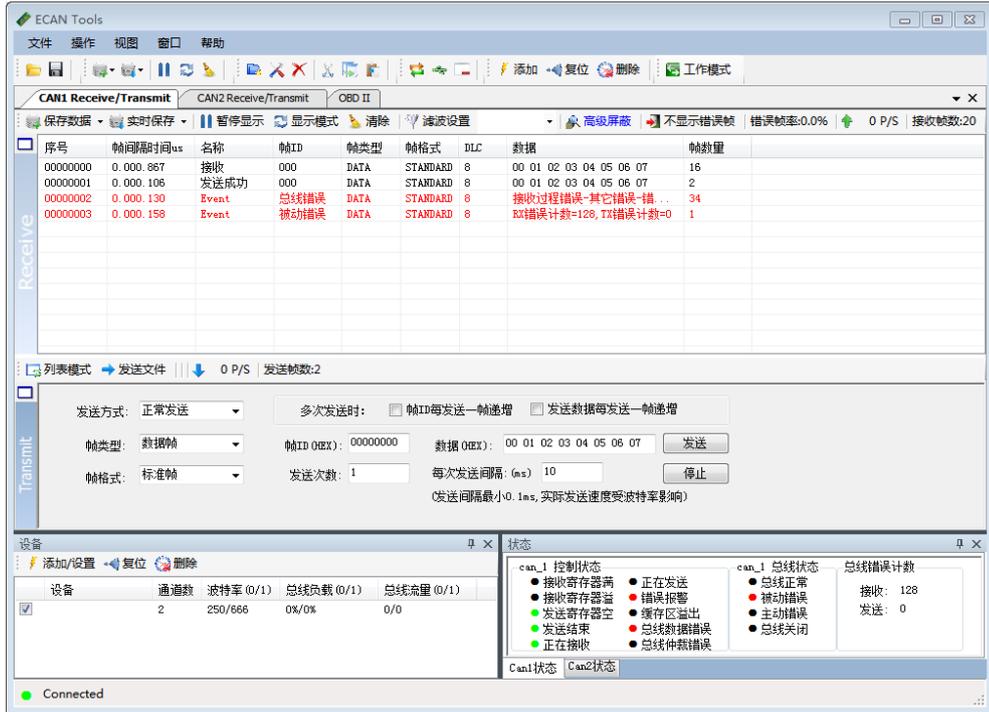
3.3.6 Error frame display function



ECANTools can obtain error frames on the bus. when receiving the error frames, it will turn red.



The error frames can also be displayed by statistics mode.



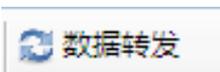
3.3.7 Shielding function



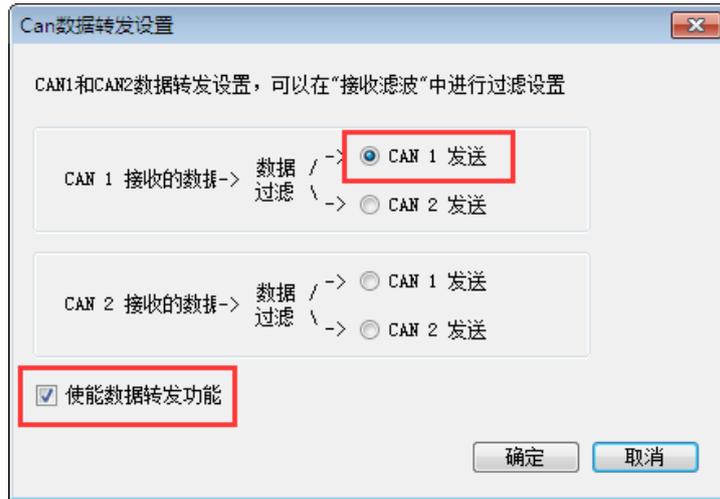
ECANTools software can shield received CAN frame data. ECANTools can classify the received data by frame ID and merge them on the left side of the list. The shield list can be set with multiple frames ID.



3.3.8 Data forwarding function

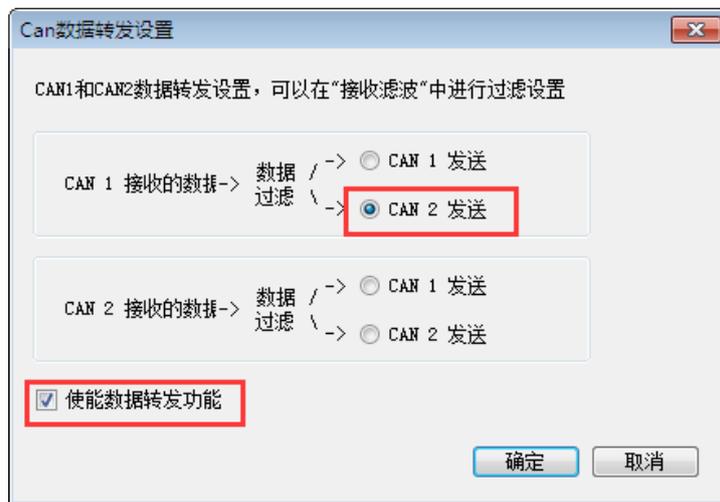


①CAN1 receives data, sent by CAN1: CAN1 receives data immediately transmit from CAN1.



序号	帧间隔时间us	名称	帧ID	帧类型	帧格式	DLC	数据	帧数里
00000001	009.622.782	接收	000	DATA	STANDARD	8	00 01 02 03 04 05 06 07	1
00000002	009.622.782	发送 (1->1)	000	DATA	STANDARD	8	00 01 02 03 04 05 06 07	1
00000003	007.358.775	接收	000	DATA	STANDARD	8	11 22 33 44 55 66 77 88	1
00000004	007.358.775	发送 (1->1)	000	DATA	STANDARD	8	11 22 33 44 55 66 77 88	1

②CAN1 receives data, sent by CAN2: CAN1 channel receives the data and transmits the data from the CAN2. The CAN1 and CAN2 channels can be set with different baud rates.



序号	帧间隔时间us	名称	帧ID	帧类型	帧格式	DLC	数据	帧数里
00000001	027.797.438	接收	000	DATA	STANDARD	8	11 22 33 44 55 66 77 88	1

序号	帧间隔时间us	名称	帧ID	帧类型	帧格式	DLC	数据	帧数量
00000001	027.797.438	发送(1->2)	000	DATA	STANDARD	8	11 22 33 44 55 66 77 88	1

Note: single channel device can only achieve ① function; data forwarding can be used with the filtering function. Filter settings details refer to 3.3.5.

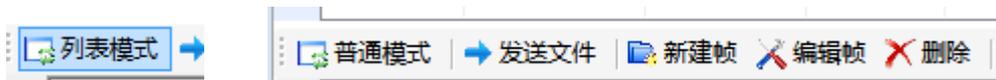
3.4 Data transmission

3.4.1 Transmit data function in normal mode



Normal mode is simple. When entering data, you need to enter spaces between each byte or there will be error.

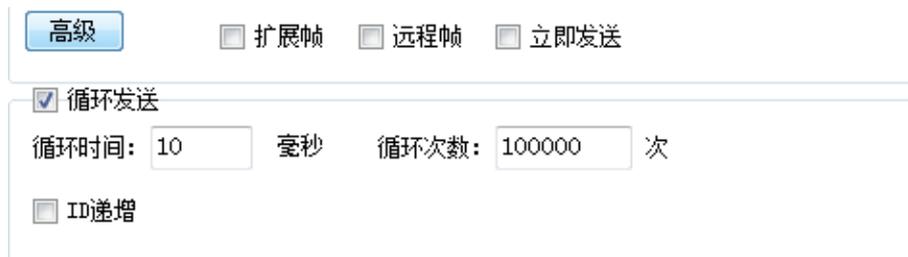
3.4.2 Transmit data function in list mode



Click New frame and you can edit the data frames you want to transmit.

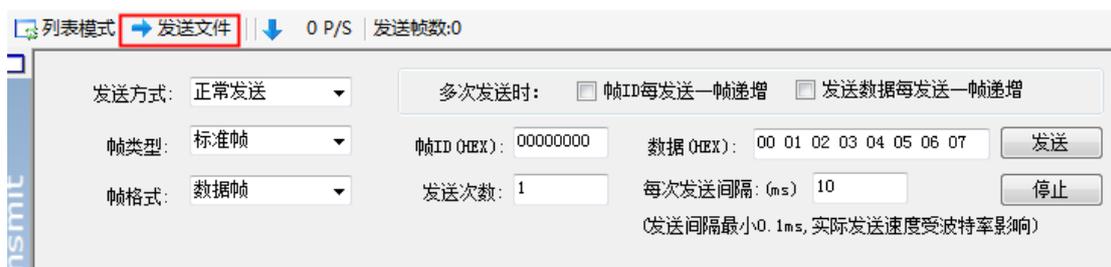


In edit data interface, you can set the frame ID, frame type, frame format, frame length. In advanced options, you can set the loop send mode, loop send interval, numbers of cycles sent etc.



When set up, CAN messages can be added to the sending queue. Click on the box on the left of the "send" to control whether to send or stop.

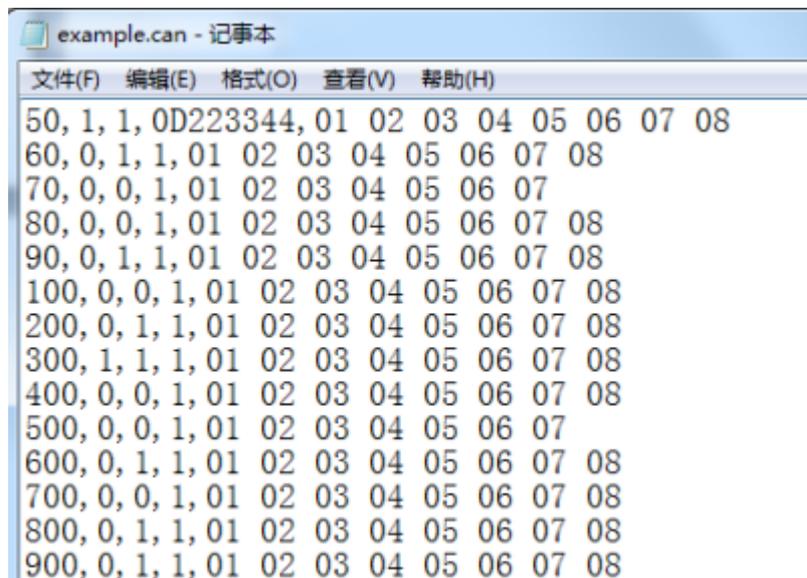
3.4.3 File sending function





The file type can be set to an ordinary file or batch file (.CAN). Ordinary files are used to download programs for CAN-Bus devices. Users need to develop their own software. Here is a focus on sending batch files.

ECANTools can save the received data as a batch file(.CAN). Batch files can be opened by Notepad. After opening, you will see the format of the saved frame data. As shown in the following figure “example.can” .



First column: Frame interval time, unit millisecond.

Second column: Standard frame 0, Extended frame 1.

Third column: Data frame 0, Remote frame 1

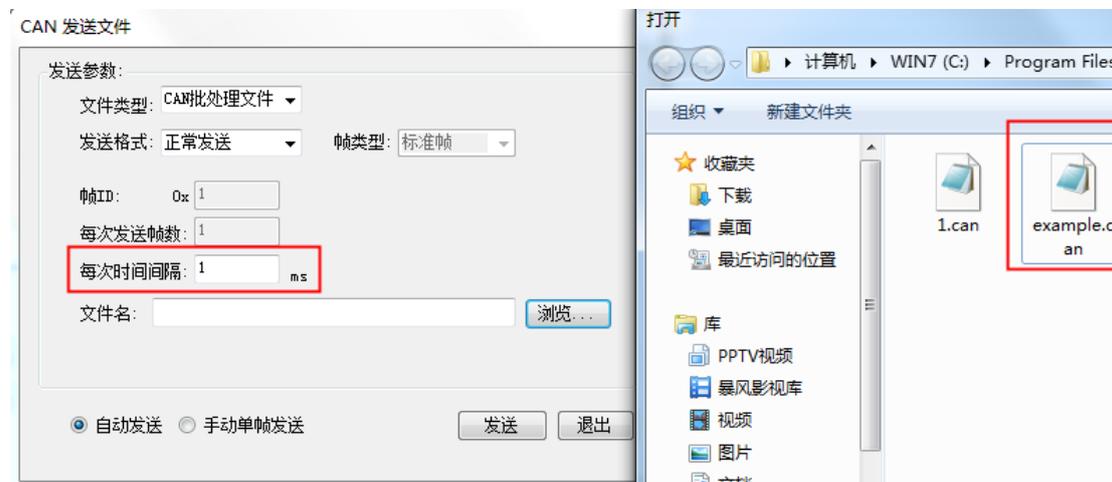
Fourth column: Frame ID

Fifth column: Frame data

The definition of each location has been given in the figure above.

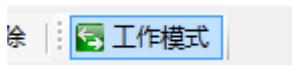
E.g. 50, 1, 1, 0D223344, 01 02 03 04 05 06 07 08

Frame interval time (unit millisecond)	Standard frame/Extended frame	Data frame/Remote frame	Frame ID	Frame data
50,	1,	1,	0D223344,	01 02 03 04 05 06 07 08

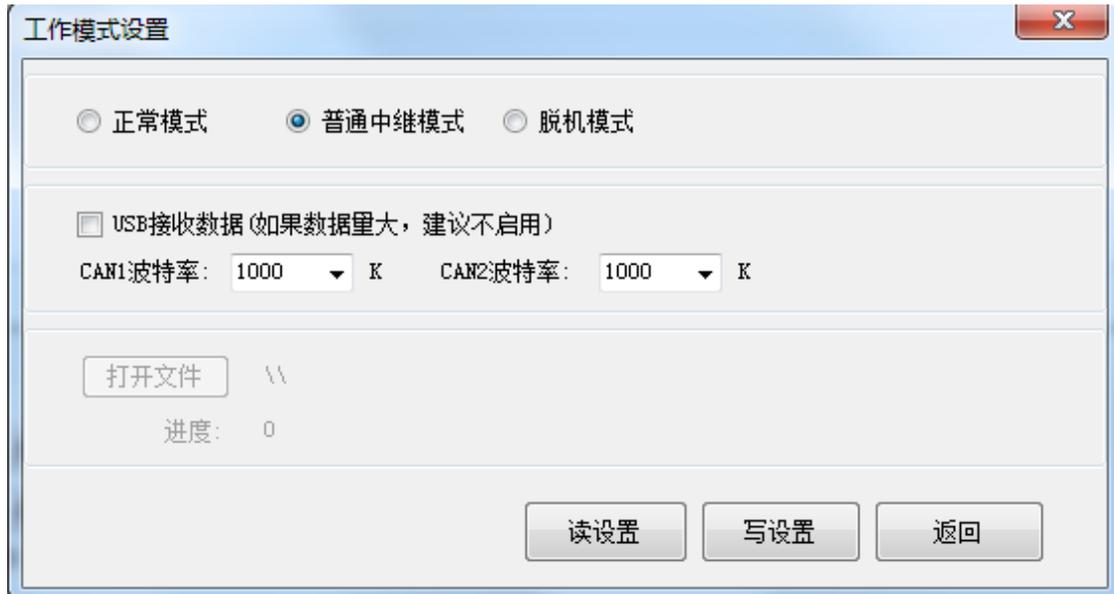


Then you can send the file by selecting the saved batch file. The time interval defaults to 1. Do not change. If you want to set the time interval, change in the batch file.

3.4.4 Relay function



At the top of the CAN1 and CAN2 channel tabs, you can select the device's mode of operation, and the double channels devices support the CAN relay function. By setting the baud rate of CAN1 and CAN2 respectively, two bus data with different baud rates can be transmitted. **Click on "write settings", then close the software, and then power-on again, you can achieve offline relay mode.** The hardware device provides external 5V DC.



3.4.5 Offline function

Users can write offline programs by loading the TXT document. After the program is written offline, the data function can be transmitted and no need to connect the computer, power is running. Specific TXT documentation rules and examples can be found in the CD with the device.

	1	2	3	4	5	6	7	8	9	10
Format description	Waiting time	Pattern	Trigger ID	Replace mask	Transmit ID	Frame format / frame type	DLC	Frame data	Times	Interval time
E.g.	10,	1,	4000 0000,	0000,	144,	0,	8,	01 02 03 04 05 06 07 08,	100,	500
Remarks	Unit ms								0 is Infinite times	Unit ms

Notes:

②Pattern: 1=CAN1 receive and transmit, 2=CAN2 receive and transmit, 3=CAN1 channel receives the data and transmits the data from the CAN2, 4=CAN2 channel receives the data and transmits the data from the CAN1.

③Trigger ID: 40000000 represent no trigger ID. If it sets to 11111111, it means that the data will not be sent until it receives a data which has the frame ID 11111111.

④Replace mask: This section is sixteen hexadecimal data and needs to be converted to binary. For example, the 0020 can be expressed as 0000 0000, 0010 0000. The first eight bits mean that whether the frames ID and lengths should be replaced. The last eight bits mean that whether the frame data should be replaced. 0 means no change, 1 means change. If it is set to replace it, the data will be 00.

⑤Transmit ID: If you have set the trigger ID, this part will only be sent if triggered. If not(That is 40000000), this ID is the normal frame ID to send.

⑥Frame format / frame type: 0=Standard data frame, 1=Standard remote frame, 2=Extended data frame, 3=Extended remote frame.

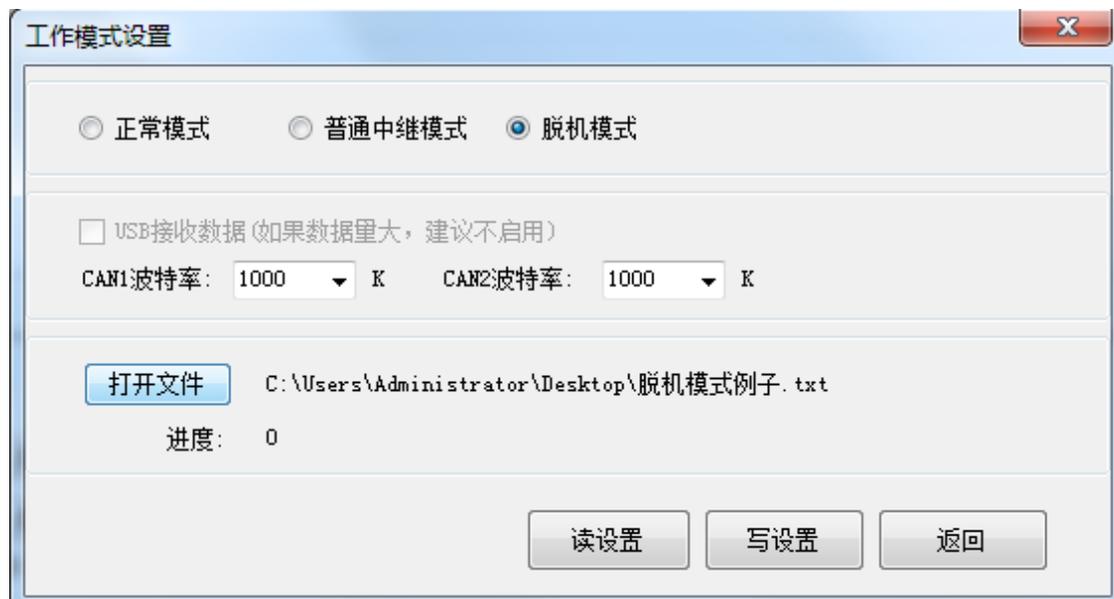
⑧Frame data: Spaces should be in the middle of each byte.

⑨Times: 0 represent Unlimited send.

E.g.

10,1,40000000,0000,144,0,8,01 02 03 04 05 06 07 08,100,500

It means: power on waiting 10ms; initializes the CAN1 channel to receive and send data; no trigger ID; do not replace ID and data; transmit ID 144; standard frame, data length is 8, frame data is 01 02.....08, send times is 100, interval time is 500ms.



3.5 Bus diagnostic function

With ECANTools, the user can read the bus state in the lower right corner of the software.

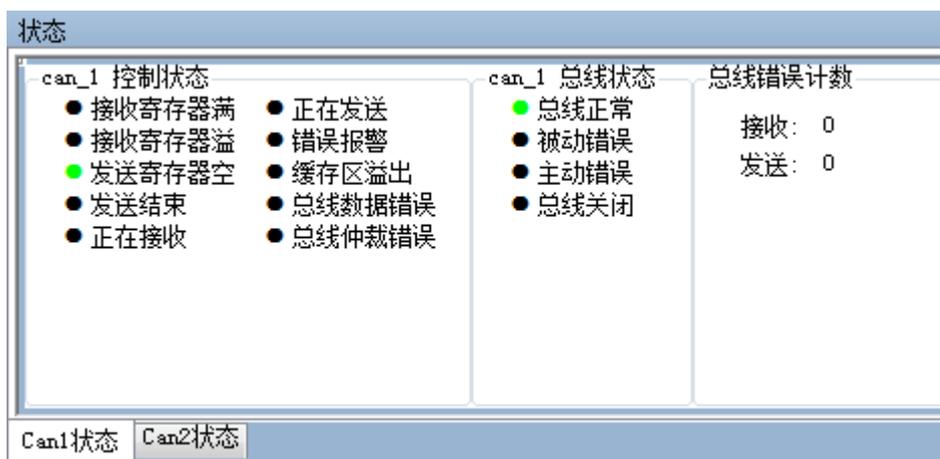
1、Active error or passive error:

Baud rate setting is incorrect or **there is a mistake in the connection** or **Bus no-load** or **Bus no response**.



2、All the green light, but no data:

Description bus no load, no data to receive.

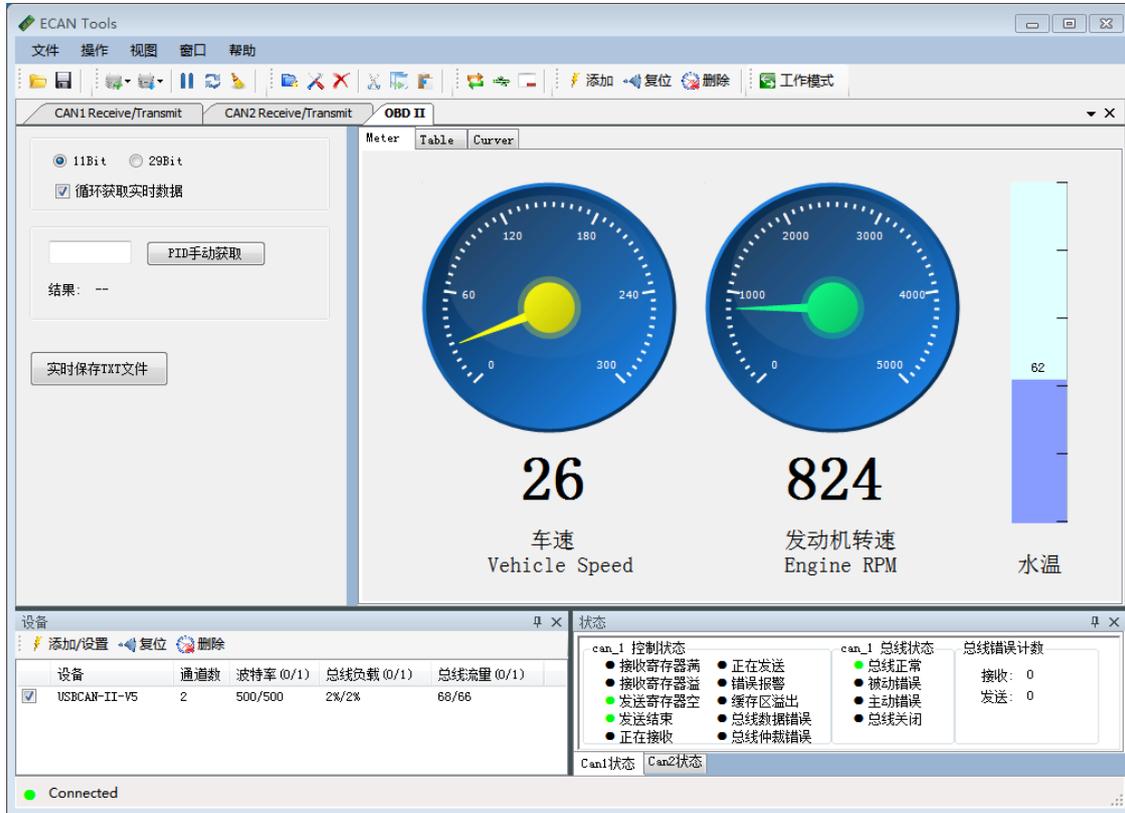


3.6 OBD display interface

Users can use the ECANTools software for automotive signal analysis functions. Using this device to connect to the car OBD interface, we can analyze the actual values of the sensors in the car. The signal analysis function only supports the

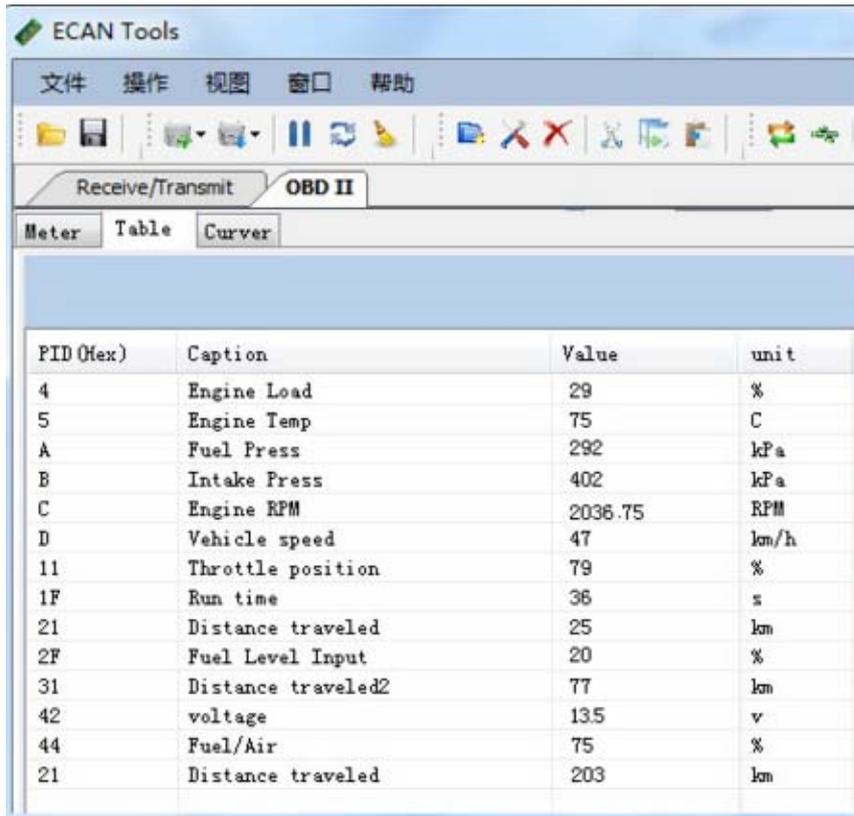
gasoline vehicle ISO15765 protocol. Speed, engine speed and water temperature can be displayed by software.

Note: this feature only supports CAN1 channel.



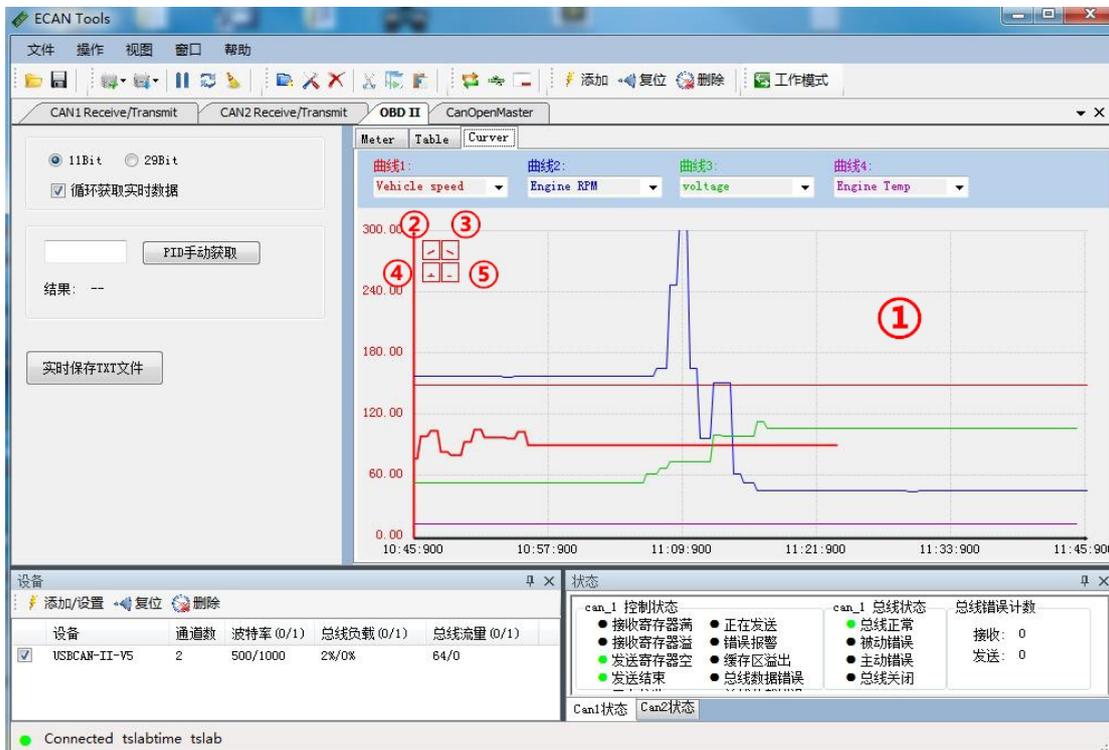
ECANTools can also read, parse, remove the car's fault code and analyze vehicle sensor data specified in the ISO15765 protocol, including: Engine Speed, Engine Temp, Fuel Press etc.

When in use, select the 11 bit button first, click "loop to get real-time data". If there is no data at this time, switch to 29 bit and try again. If there is no data in both mode, please check baud rate and connection. Most car power bus baud rate is 500Kbps.



PID (Hex)	Caption	Value	unit
4	Engine Load	29	%
5	Engine Temp	75	C
A	Fuel Press	292	kPa
B	Intake Press	402	kPa
C	Engine RPM	2036.75	RPM
D	Vehicle speed	47	km/h
11	Throttle position	79	%
1F	Run time	36	s
21	Distance traveled	25	km
2F	Fuel Level Input	20	%
31	Distance traveled2	77	km
42	voltage	135	v
44	Fuel/Air	75	%
21	Distance traveled	203	km

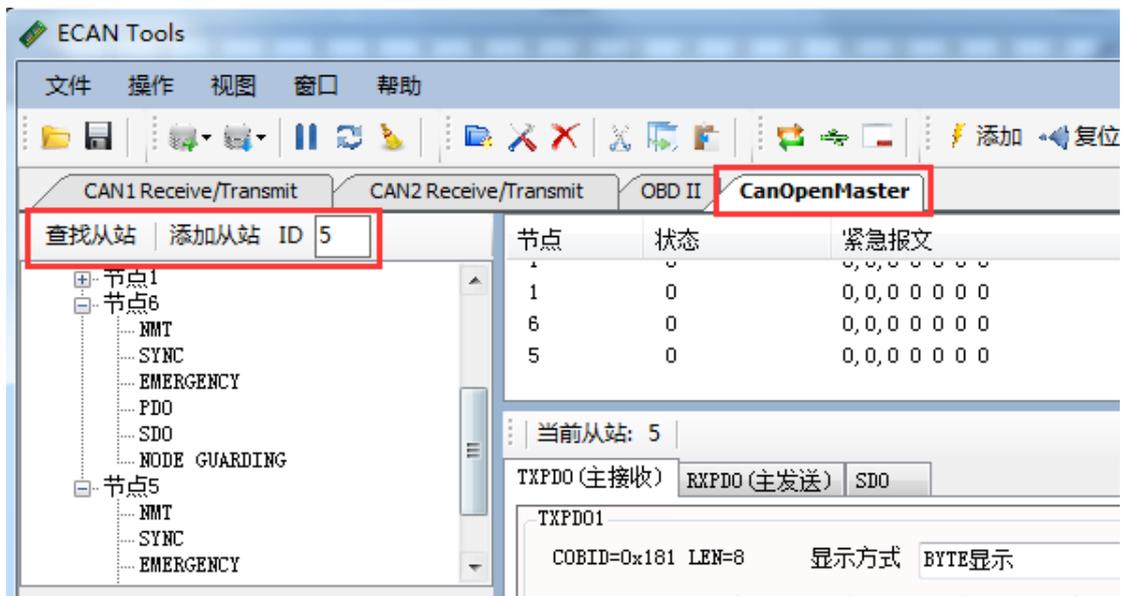
The data values can also be displayed in real time through the curve as below. Users can select four variables to display simultaneously on the same screen.



- ①Curve display window
- ②Switch the bold curve to the left
- ③Switch the bold curve to the right
- ④Increase the range of the Y axis of the corresponding curve
- ⑤Decrease the range of the Y axis of the corresponding curve

3.7 CANopen master station function

Users can click on the left "Find slave station" to scan all CANopen slave nodes on the CAN bus. You can also add CANopen slave station manually. The station which is already been added will be shown as below. The user can double-click the specified node number to activate the interface to communicate with the slave station.

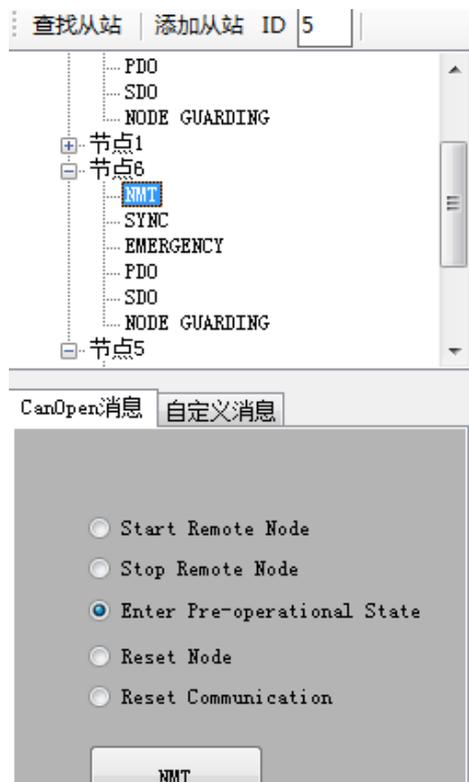


The CANopen master station function turns the USBCAN device into a CANopen master card and accesses the CANopen network. ECANTools has a variety of commonly used CANopen master station function. For example, NMT(Network Management), SYNC(synchronous protocol), EMERGENCY(urgent message), PDO(process data object), SDO(service data object), NODE GUARDING(node protection).

The following table lists the functional codes and frame ID ranges, which are correspond to the CANopen common frame types.

Message type	Function code	COB-ID range(Hex)
NMT	0000	000h
SYNC	0001	080h
EMERGENCY	0001	081h-0FFh
TIME	0010	100h
PDO1(transmit)	0011	181h-1FFh
PDO1(receive)	0100	201h-27Fh
PDO2(transmit)	0101	281h-2FFh
PDO2(receive)	0110	301h-37Fh
PDO3(transmit)	0111	381h-3FFh
PDO3(receive)	1000	401h-47Fh
PDO4(transmit)	1001	481h-4FFh
PDO4(receive)	1010	501h-57Fh
SDO(transmit)	1011	581h-5FFh
SDO(receive)	1100	601h-67Fh
NMT Error Control	1110	701h-77Fh

3.7.1 NMT command



NMT command provides Network management(such as initialization, start and stop nodes, detection of failed nodes).

The user can use the NMT command to change the running state of the slave node.

Start remote node——Sets the node into the operation state

Stop remote node——Sets the node into the stop state

Enter pre-operational state——Sets the node into the pre-operation state

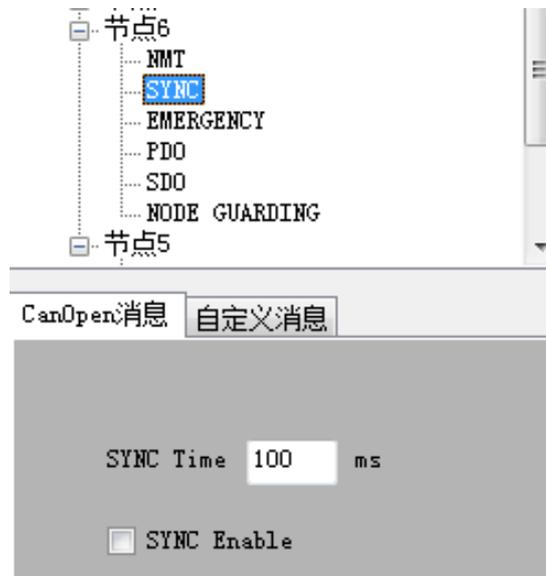
Reset node——Sets node reset

Reset communication——Sets node reset communication

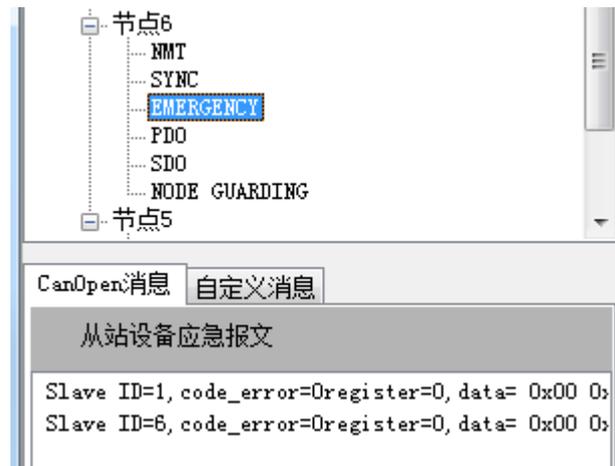
3.7.2 SYNC message

SYNC is the synchronous message sent by the master station. All stations that have synchronized PDO communicate with the master station based on the SYNC message.

The user can cyclically send SYNC messages via the ECANTools.

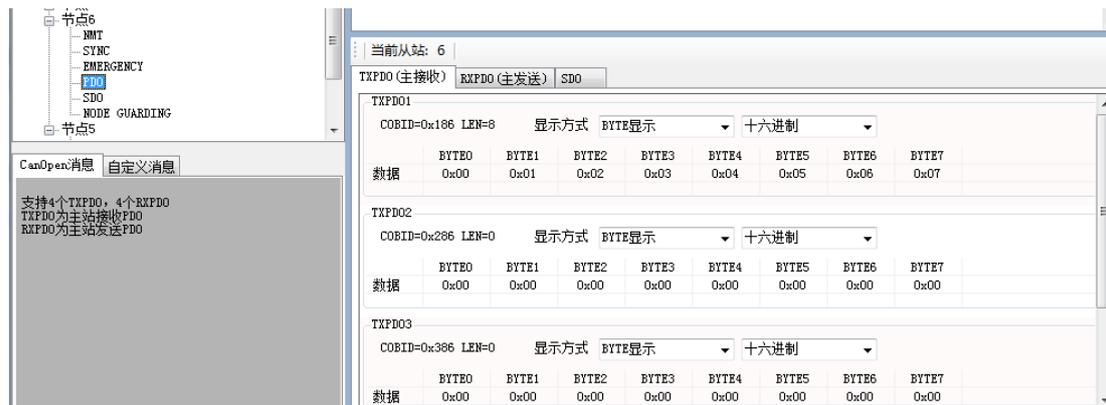


3.7.3 EMERGENCY message



ECANTools can receive EMERGENCY messages from the slave station node. The message is sent by a slave node in a state of emergency. The CANopen master function of the ECANTools can receive and process this EMERGENCY message.

3.7.4 PDO (Process data object)

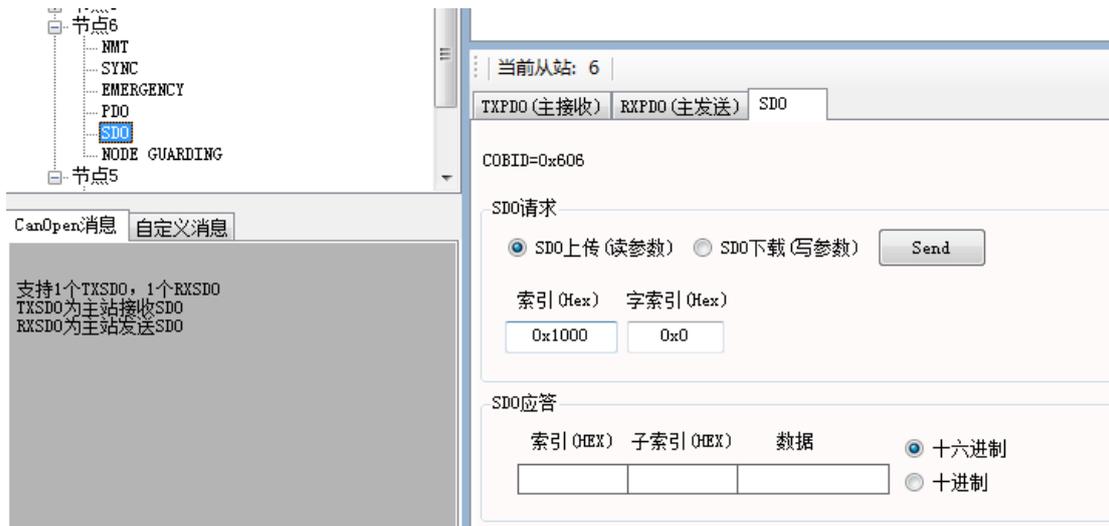


CANopen nodes use PDO to transfer data, which is mainly used to transmit real-time data.

PDO, full name is process data object, belongs to process data with one-way transmission. For receiving node, there is no need to respond the confirmed CAN message.

There are 4 pairs of transmitting and receiving PDO in ECANTools, which are TPDO/RPDO.

3.7.5 SDO (Service data object)



CANopen master module SDO function is divided into transmitting and receiving SDO. The SDO function in ECANTools allows users to communicate with the slave station by editing indexes and sub indexes.

Index and object tables

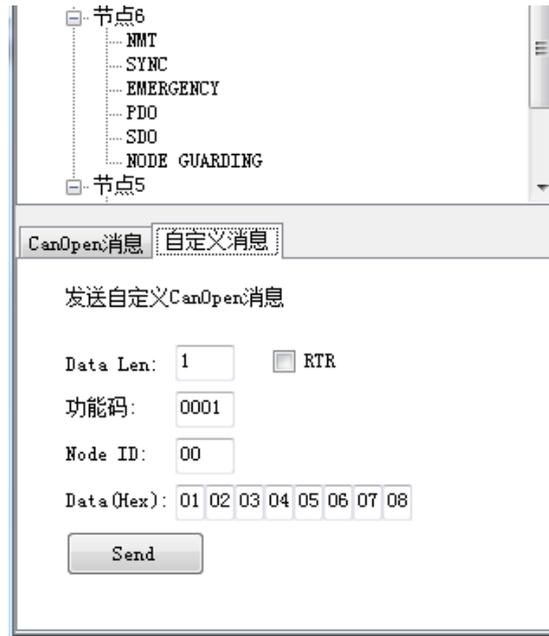
Index	Object
000h	Reserve
0001h-001Fh	Basic data type
0020h-003Fh	Complex data type
0040h-005Fh	Manufacturer data type
0060h-007Fh	The basic data type of the device description
0080h-009Fh	The complex data type of the device description
00A0h-0FFFh	Reserve
1000h-1FFFh	Communication parameter
2000h-5FFFh	Manufacturer's special device description file
6000h-9FFFh	Standard device description file
A000h-BFFFh	Standard interface description file
C000h-FFFFh	Reserve

3.7.6 NODE GUARDING



There are two ways to implement the node guarding function in ECANTools. The master station sends the command automatically to inquire about the status of the slave node (Node Guarding) and the slave node transmits its status periodically in the heartbeat (Heartbeat).

ECANTools can also manually simulate CANopen data by editing custom messages. The user can send data directly to the CANopen slave station by writing function codes, slave stations node ID and data.



The function code corresponding function is shown in the following table:

- To configure PDO 0x1800+n
- COB-ID is 0x387
- PDO always triggers transmission
- It must contain data: data X(2bytes), data Y(4bytes)

In the following order

- data X defined in index 0x6000, sub-index 03
- data Y defined in index 0x2010, sub-index 21
- 1-- index 1800+n, sub-index 01: write COBID (4bytes)
- 2-- index 1800+n, sub-index 02: write transport byte "t"(1byte)
 - t=1 to 0xF0: PDO will be transmitted if it receives "t" times SYNC.
 - t=FD : transfer after receiving the PDO request (rtr=1)
 - t=FF: the node transmits PDO automatically according to the event
- 3-- index 1A00+n: a mapping that defines the first n data
 - sub-index 0: the number of data written to PDO (1byte). In this case, write "2"
 - sub-index 1: define where to look for the first data and size to write (8bytes)

The format is: index (2 bytes) – sub index (1 byte) – size in bits (1 byte)

In this case, write "60000310"

sub-index 2: define where to look for the second data and size to write (8bytes)

In this case, write"20102120"

Configuration node 5 PDO 1802 in each of the 3 SYNC transmission, the sending SDO (s) should be

605 23 02 18 01 00 00 8703

605 2F 02 18 02 03 00 00 00

605 2F 02 1A 00 02 00 00 00

605 23 02 1A 01 10 03 00 60

605 23 02 1A 02 20 21 10 20

Sales and service

Shenyang Guangcheng Technology Co., Ltd.

Address: Industrial Design Center, No. 42 Chongshan
Middle Road, Huanggu District, Shenyang
City, Liaoning Province.



QQ: 2881884588

E-mail: 2881884588@qq.com

Tel: +86-24-31230060

Website: www.gcgd.net

Sales and service Tel: +86-18309815706

After - sales service telephone Number: +86-13840170070

WeChat Number:13840170070