

GCAN-402

two channel CAN-Bus data recorder

User manual



Ver: V3.11 (2017/3/15)

History

Ver.	Date	Info.
V1.00	2015/12/10	Create document
V2.01	2016/3/22	Fixed working parameters
V3.01	2016/8/4	Add some parameters
V3.11	2017/3/15	Add some parameters

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1. Introduction

1.1 Functional Overview

GCAN-402 two channel CAN-Bus data recorder is specially used for offline record CAN-Bus data.

This adapter has integrated two CAN-bus interface and one TF card port. Users can use TF card record bus data real-time.

GCAN-402 is suitable for historical data playback, error message analysis. That can be widely used in automobile, rail vehicle, industry control and others large amount of data and not easy to troubleshoot fault system.

1.2 Properties at a Glance

- High speed 32-bit industrial-grade processor;
- Use an external power supply (DC +9~30V, typical 24V 50mA);
- EMC : contact $\pm 2\text{KV}$, air $\pm 15\text{KV}$;
- EFT: $\pm 1\text{KV}$;
- SURGE: $\pm 1\text{KV}$;
- CAN-Bus connection via OPEH4, PHOENIX;
- Compliant with CAN specifications 2.0A (11-Bit ID) and 2.0B (29-Bit ID);
- CAN-Bus baud rate 10Kbps~1Mbps, set by code switch;
- Galvanic isolation on the CAN connection up to 1500 V;
- The highest receiving data traffic: 8000 fps/s;
- CAN data time stamp resolution 100 μs ;
- Extended operating temperature range from -40 to 85 $^{\circ}\text{C}$;
- Dimensions: (L) 102 mm * (W) 63mm * (H)23mm。

1.3 Typical application

- High-speed rail control cabinet communication record
- Metro electrical cabinet communication record
- Auto mobile data recording playback
- CAN-Bus black box
- Occasional error logging analysis

2. Installation

2.1 Power supply

GCAN-402 support 9~30V wide range of power supply, so the module can be applied to most of the industrial field and the car interior, module power supply terminals defined as shown in table 2.1.

Port	Name	Function
Power	+	VCC
	PE	connection to frame
	-	GND

Table 2.1 GCAN-402 power terminal interface definitions

2.2 Connect to CAN-Bus

GCAN-402 has two CAN-Bus by a plug type terminal leads, these CAN-Bus channels can connect to CAN-Bus network or devices. Terminal pin definition as Table 2.2.

Port	Name	Function
CAN	1H	CAN1_H
	1L	CAN1_L
	2H	CAN2_H
	2L	CAN2_L

Table 2.2 GCAN-402 CAN-Bus pin definition

Note: In practical use, most of the time just connected the CAN_H to CAN_H and CAN_L connected to CAN_L then communication can be realized.

3. Adapter in use

3.1 Correction system time

GCAN-402 has integrated system clock, system clock and file system can record data by date.

GCAN-402 will create folder every day named by date. Bus data will be automatically deposited in the corresponding folder.

GCAN-402 will create a new file per minute, data will saved to the corresponding file.

If GCAN-402 adapter's system clock not real before use, user can adjust their own time by following methods.

1. Use an USB cable to connect the GCAN-402 and PC. (USB port in Figure 3.2)
2. Use serial debugging assistant send your time to the adapter.

(Serial port baud rate: 115200, data bits: 8, stop bit: 1, parity bit None, instruction is: "NT = XXX". For example: send "NT = 20170329215500", will amend the system time to March 29, 2017 21:55:00. Please note that, send and receive in ASCII and select "send new line", don't choose "hex".)

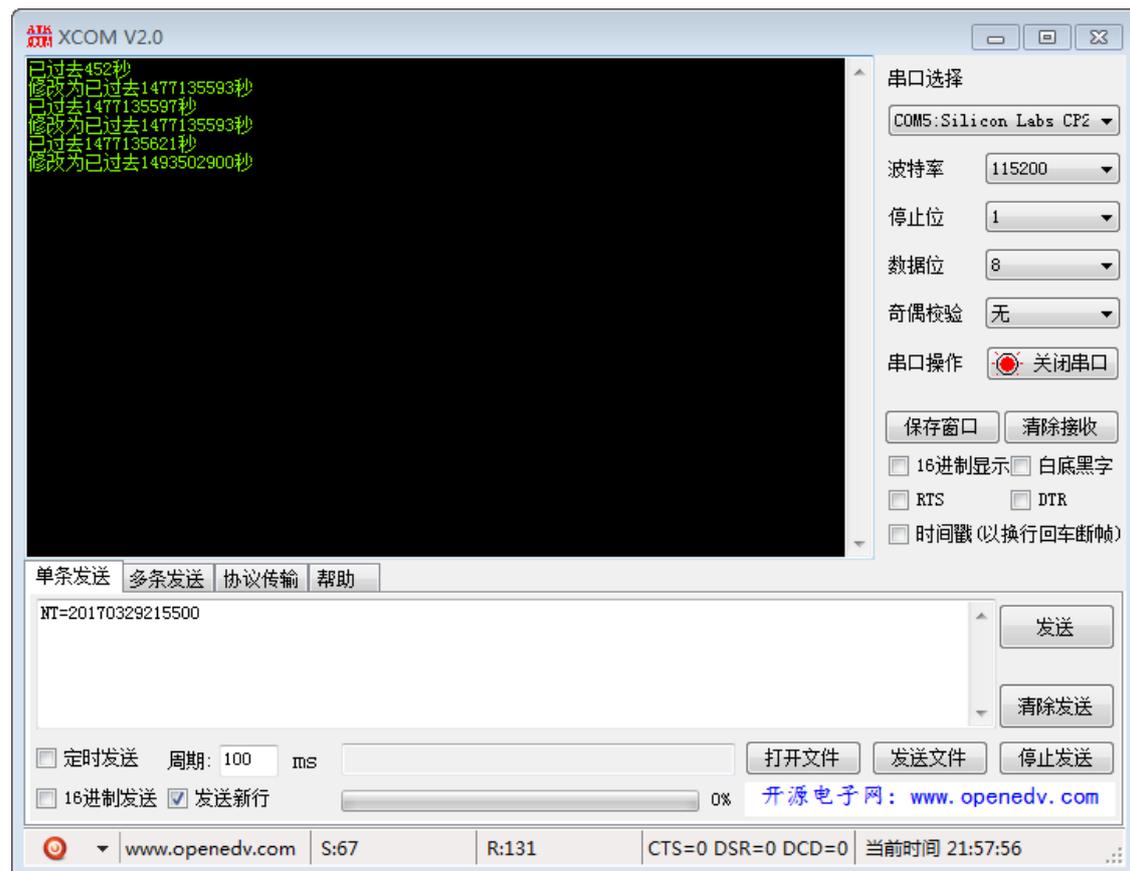


Figure 3.1 GCAN-402 correction system time interface

3.2 CAN bus configuration

GCAN-402 adapter generally require users to set the CAN-Bus communication parameters according to the actual demand before use.

3.2.1 CAN-bus baud rate configuration

GCAN-402 can support some commonly used baud rate between 10K~1000K. Baud rate can be set by code switch, the code switch position as shown in figure 3.2.



Figure 3.2 GCAN-402 profile

The code switch "1, 2, 3, 4, 5" can set the baud rate of CAN1 and CAN2, and the 8 switch has a special definition, the default side down, please do not arbitrarily set. Dial the code switch down the default is 0, each baud rate as shown in the table 3.1.

Note: Modify the baud rate must power down

CAN1		CAN2	
Switch No. 1, 2, 3		Switch No. 4, 5	
0	1Mbps	0	1 Mbps
1	500Kbps	1	500 Kbps
2	250 Kbps	2	250 Kbps
3	125 Kbps	3	125 Kbps
4	100 Kbps		
5	50 Kbps		
6	40 Kbps		
7	20 Kbps		

Table 3.1 GCAN-402 Baud rate configuration chart

3.2.2 CAN-Bus terminal resistance configuration

GCAN-402 has been integrated internal 120Ω terminal resistor, users can choose whether access through dial the code switch.

3.3 Connect to CAN

CANCOM adapter connect to CAN-Bus as chapter 2.2, CAN_H to CAN_H, CAN_L to CAN_L.

The CAN-bus network adopts topological structure, only the two furthest terminal need to connect 120Ω terminal resistance between CAN_H and CAN_L. For branch connection, its length should not be more than 3m. CAN-bus nodes connection as shown in figure 3.1

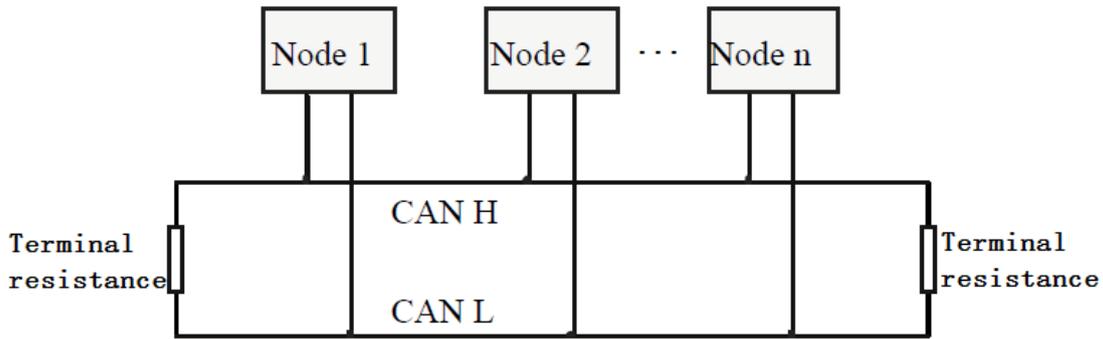


Figure 3.1 CAN-bus network

Note: the CAN-bus cable can use ordinary twisted-pair cable, shielded twisted-pair cable. Theory of the maximum communication distance depends on the bus baud rate, Their relationship as shown in the Table 3.1.

Baud rate	Distance
1 Mbit/s	40m
500 kbit/s	110m
250 kbit/s	240m
125 kbit/s	500m
50 kbit/s	1.3km
20 kbit/s	3.3km
10 kbit/s	6.6km
5 kbit/s	13km

Table 3.1 relationship of baud rate and distance

3.4 CAN-Bus terminal resistance

In order to improving the communication reliability and eliminating CAN-bus terminal reflection, the two furthest terminal need to connect terminal resistance between CAN_H and CAN_L as shown in figure 3.2. Terminal resistance values determined by the characteristic impedance of the cables. Such as, the characteristic impedance is 120Ω.

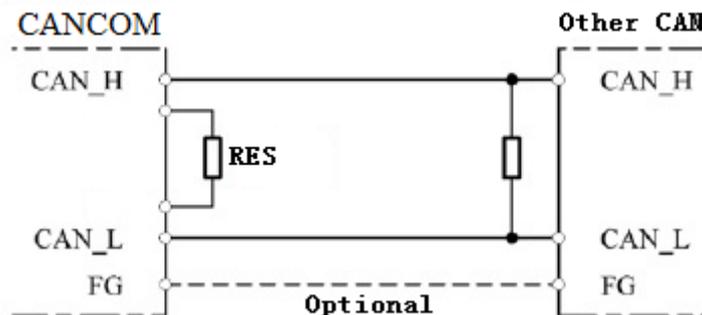


Figure 3.2 CANCOM connect to other CAN devices

Note: CANCOM adapter not integrated 120Ω terminal resistance, users must

connect it if necessary.

3.5 System LED

GCAN-402 adapter with one SYS indicator, one CAN indicator to indicate the adapter status. More functions are shown in table 3.3 and 3.4.

LED	Colour	State
SYS	Green	System run
CAN	Green	CAN-Bus state

Table 3.3 GCAN-402 state LED

When GCAN-402 adapter power on, SYS LED blinking, indicates the adapter has power supply, the system is initialized; Otherwise, a system power failure or system errors has exist.

When power up, CAN LED on indicates TF card error.

When CAN LED on and then off, indicates TF card work fine .

When adapter receive data, CAN LED will blinking.

LED	State	Indicates
SYS	OFF	System error
	ON	System initialization failed
	Blinking	System initialization OK
CAN	ON then turn OFF	No CAN-Bus data
	Blinking	CAN-Bus data transfer
	ON	TF card error

Table 3.4 GCAN-402 state

4. File saving

Note: GCAN-402 only supports a maximum capacity of 32G and the file system is FAT32 format of TF card, if your TF card is not the FAT32, the card must be reformatted into FAT32 format, data will be removed, please careful operation.

TF card is full of files that are not automatically overwritten.If the time interval between frames is 1 ms,the data can be stored for 24 days(32GTFcard).

GCAN-402 has integrated system clock, system clock and file system can record data by date.

GCAN-402 will create folder every day named by date. Bus data will be automatically deposited in the corresponding folder.

GCAN-402 will create a new file per minute, data will saved to the corresponding file. Shown in figure 4.1

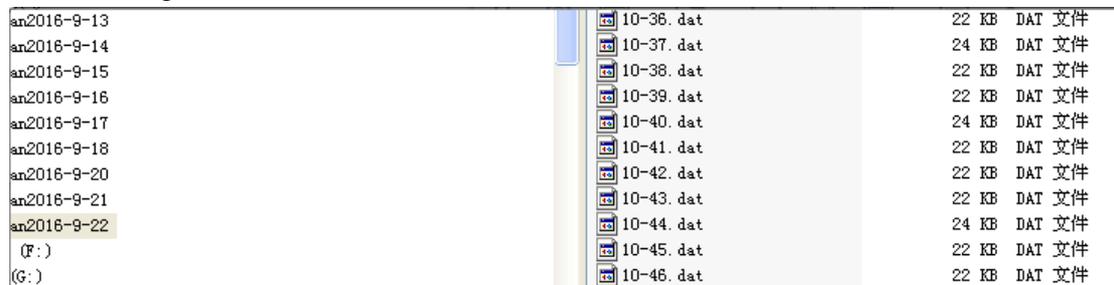


Figure 4.1 file form

GCAN-402 supports four kinds of saving data format: binary files (DAT), text file (TXT), the files that can be used in Vector's software (.ASC), batch file (.CAN), through NO. 6, 7 code switch, as shown in figure 4.2.

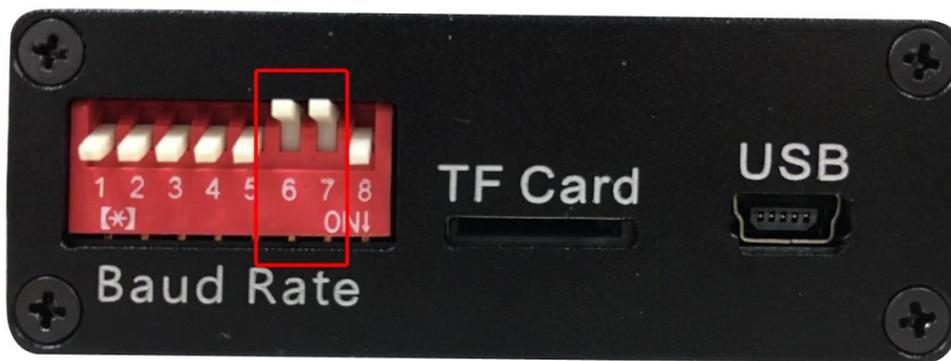


Figure 4.2 File type switch

Switch 6, 7 can set the data storage format. The switch up means "1", down means "0". "00" is binary file, "01" is text file, "10" is Vector file, "11" is batch file.

4.1 Binary file format (.DAT)

Binary file's content as shown in figure 4.3.

```

0000000h: 37 03 00 08 DF 07 00 00 02 01 31 00 00 00 00 00 ;
0000010h: 07 00 00 08 E8 07 00 00 07 41 31 00 00 00 00 00 ;
0000020h: 37 03 00 08 DF 07 00 00 02 01 42 00 00 00 00 00 ;
0000030h: 08 00 00 08 E8 07 00 00 07 41 42 FF 2E 00 00 00 ;
0000040h: 36 03 00 08 DF 07 00 00 02 01 01 00 00 00 00 00 ;
0000050h: 03 00 00 08 E8 07 00 00 07 41 01 FF FF FF FF FF ;
0000060h: 3B 03 00 08 DF 07 00 00 02 01 04 00 00 00 00 00 ;
0000070h: 04 00 00 08 E8 07 00 00 07 41 04 00 00 00 00 00 ;
0000080h: 3A 03 00 08 DF 07 00 00 02 01 05 00 00 00 00 00 ;
0000090h: 04 00 00 08 E8 07 00 00 07 41 05 00 00 00 00 00 ;
00000a0h: 3A 03 00 08 DF 07 00 00 02 01 0C 00 00 00 00 00 ;
00000b0h: 04 00 00 08 E8 07 00 00 07 41 0C FF CE 00 00 00 ;

```

Figure 4.3 binary file format

When users selects save into a binary file format, the specific data as shown below:

The first second byte: time interval between frames, precision: 0.1ms

The third byte: CAN channel, "00" means CAN1, "01" means CAN2

The fourth byte: frame info (2 characters, please refer to the appendix B for the specific meaning)

The fifth sixth seventh eighth byte: frame ID

After ninth bytes: frame data

4.2 Text file format (.TXT)

Test file's content as shown in figure 4.4.



```

11-2.txt - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
0063,0,08,000007FF,FC,09,02,03,04,05,06,07,
0063,0,08,000007FF,FD,09,02,03,04,05,06,07,
0063,0,08,000007FF,FE,09,02,03,04,05,06,07,
0064,0,08,000007FF,FF,09,02,03,04,05,06,07,
0063,0,08,000007FF,00,0A,02,03,04,05,06,07,
0064,0,08,000007FF,01,0A,02,03,04,05,06,07,
0063,0,08,000007FF,02,0A,02,03,04,05,06,07,
0063,0,08,000007FF,03,0A,02,03,04,05,06,07,
0064,0,08,000007FF,04,0A,02,03,04,05,06,07,
0063,0,08,000007FF,05,0A,02,03,04,05,06,07,
0064,0,08,000007FF,06,0A,02,03,04,05,06,07,

```

Figure 4.4 test file format

When users selects save into a text file format, the specific data as shown below:

The first column: time interval between frames, precision: 0.1ms (6 characters)

The second column: CAN channel, "0" means CAN1, "1" means CAN2

The third column: frame info (2 characters, please refer to the appendix B for the specific meaning)

The fourth column: frame ID (8 characters)

After the fifth column: frame data

4.3 Vector's software file format (.ASC)

Test file's content as shown in figure 4.5.

```

date 2018/1/12 11:39:26
base hex timestamps absolute
18.6895 1 000x Rx d 8 00 01 02 03 04 05 06 07
18.6994 1 000x Rx d 8 01 01 02 03 04 05 06 07
18.7093 1 000x Rx d 8 02 01 02 03 04 05 06 07
18.7193 1 000x Rx d 8 03 01 02 03 04 05 06 07
18.7292 1 000x Rx d 8 04 01 02 03 04 05 06 07
18.7392 1 000x Rx d 8 05 01 02 03 04 05 06 07
18.7491 1 000x Rx d 8 06 01 02 03 04 05 06 07
18.7590 1 000x Rx d 8 07 01 02 03 04 05 06 07
18.7690 1 000x Rx d 8 08 01 02 03 04 05 06 07
18.7789 1 000x Rx d 8 09 01 02 03 04 05 06 07
18.7888 1 000x Rx d 8 0A 01 02 03 04 05 06 07

```

Figure 4.5 ASC file format

When users selects save into a ASC file format, the specific data as shown below:

The first column: data time (the time from file creation to receive the data, unit: s)

The second column: CAN channel, "1" means CAN1, "2" means CAN2

The third column: frame ID

The fourth column: the data direction (Tx or Rx)

The fifth column: frame type ("d" is data frame, "r" is remote frame)

The sixth column: DLC

After the seventh column: frame data

4.4 Batch file format (.CAN)

Batch file's content as shown in figure 4.6.

```

24800, 0, 0, 0000, 00 01 02 03 04 05 06 07
10, 0, 0, 0000, 01 01 02 03 04 05 06 07
10, 0, 0, 0000, 02 01 02 03 04 05 06 07
10, 0, 0, 0000, 03 01 02 03 04 05 06 07
10, 0, 0, 0000, 04 01 02 03 04 05 06 07
10, 0, 0, 0000, 05 01 02 03 04 05 06 07
10, 0, 0, 0000, 06 01 02 03 04 05 06 07
10, 0, 0, 0000, 07 01 02 03 04 05 06 07
10, 0, 0, 0000, 08 01 02 03 04 05 06 07
10, 0, 0, 0000, 09 01 02 03 04 05 06 07

```

Figure 4.6 batch file format

When users selects save into a batch file format, the specific data as shown below:

The first column: time interval between frames, precision: 1ms

The second column: "0" means standard frame, "1" means extended frame.

The third column: "0" means data frame, "1" means remote frame.

The fourth column: frame ID

After the fifth column: frame data

(the batch file can be sent to CAN-Bus by using USBCAN-II Pro analyzer and ECAN Tools software, you can use the last contact information to contact us for USBCAN-II Pro analyzer)

5. Technical Specifications

Connection	
CAN	OPEN4 PHOENIX
POWER	OPEN3 PHOENIX
TF card	
TF card	Maximum 32G , FAT32 format
CAN-Bus	
CAN standard	ISO 11898, CAN2.0A/B
CAN baud rate	10Kbit/s~1Mbit/s
Isolate	1500V, DC-DC
Terminal Resistor	Integrated
Power	
Voltage	+9~30V DC
Current	24V 50mA, typical
Environment	
Temperature	-40℃~+85℃
Humidness	15%~90%RH
EMC test	EN 55024:2011-09 EN 55022:2011-12
IP grade	IP 20
Basic	
Dimension	102mm *63mm *23mm
Weight	130g

Appendix A: CAN2.0B frame format

CAN2.0B standard frame

CAN standard frame format is 11 bytes, including two parts: information and data. The first 3 bytes for information.

Bit Byte	7	6	5	4	3	2	1	0
1	FF	RTR	×	×	DLC			
2	(Message identifier)				ID.10—ID.3			
3	ID.2—ID.0			×	×	×	×	×
4	data 1							
5	data 2							
6	data 3							
7	data 4							
8	data 5							
9	data 6							
10	data 7							
11	data 8							

Byte 1 for the frame information. Seventh (FF) means the frame format, in the standard frame, FF = 0; Sixth (RTR) means the type of frame, RTR = 0 means for the data frame, RTR = 1 for remote frame; DLC means the length of the data.

Byte 2, 3 for the message identifier.

Bytes 4~11 for the data of the data frame, remote frame is invalid.

CAN2.0B extended frame

CAN extended frame format is 13 bytes, including two parts: information and data. The first 5 bytes for information.

Bit Byte	7	6	5	4	3	2	1	0
1	FF	RTR	×	×	DLC			
2	(Message identifier)				ID.28—ID.21			
3	ID.20—ID.13							
2	ID.12—ID.5							
3	ID.4—ID.0				×	×	×	
4	data 1							
5	data 2							
6	data 3							
7	data 4							
8	data 5							
9	data 6							
10	data 7							
11	data 8							

Byte 1 for the frame information. Seventh (FF) means the frame format, in the standard frame, FF = 0; Sixth (RTR) means the type of frame, RTR = 0 means for the data frame, RTR = 1 for remote frame; DLC means the length of the data.

Byte 2~5 for the message identifier.

Bytes 4~11 for the data of the data frame, remote frame is invalid.

Appendix B: CAN-Bus data frame definition

A CAN frame contains 13 bytes. The content of 13 bytes CAN frame information + frame ID + frame data.



 frame information, 1 byte, used to identify CAN frame info, such as type, length, etc.

BIT7				BIT0			
FF	Reserve	Reserve	RTR	B3	B2	B1	B0

FF: Standard and extended identification, 1 for the extended frame, 0 for the standard frame

RTR: Remote and data identification, 1 for remote frame, 0 for the data frame.

Reserve: Retains the value is 0, cannot 1.

B3~B0: The data length(DLC), identify the frame length of the data.

For example:

Frame information	Specific meaning
08	Standard, data frame, DLC=8
88	Extended, data frame, DLC=8
18	Standard, remote frame, DLC=8
98	Extended, remote frame, DLC=8

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