LINEEYE

Option for LE-3500XR/LE-2500XR

CAN FD/CAN/LIN Communications
Expansion Kit

OP-SB7XC

Instruction Manual

Instruction

Thank you for your purchase of *OP-SB7XC*. To use it correctly, you are advised to read and understand this instruction manual thoroughly. Keep this together with the warranty. If you encounter any problems, you will find helpful information in this manual.

📖 NOTICE

It is prohibited to reprint or duplicate any part of the whole of this instruction manual without prior permission from LINEEYE. The content of this instruction manual and specifications of the products are subject to change without any notice. This instruction manual has been designed and edited with great care to give you all necessary information. If you have any questions, feel free to direct your inquiries to LINEEYE. LINEEYE makes no warranty or guarantee, either expressed or implied with respect to its quality, performance, merchantability, or fitness for a particular purpose. LINEEYE shall not be liable for direct, in-direct, special, incidental, or consequential damages resulting from any defect in the product. The warranty and remedies set forth above are exclusive and in lieu of all others.

📖 USER LIMITATION

This product has been developed for the purpose of using as an analyzer only. When you use this product with the following devices that are required to function with a high degree of reliability, safety and accuracy, use it under considering the safe design of the system in order to maintain reliability and safety for that system;
*Devices that are directly related to transportation such as airplanes, trains, cars etc.
*Devices for crime prevention and disaster privension.
*Each kind of safety devices and so on.
This product has not been developed for the use that needs exclusivey high reliability and safety: aerospace apparatus, trunk communication apparatus, nuclear control apparatus, medical apparatus related with life maintenance etc. Therefore, do no use for those purposes.

Safety Information

📖 Read this first !!

This Safety Information includes the following important information in order to not only have you learn the right way to use the analyzer, but also prevent you from causing damage to people and property. Before using, please read the main contents after you understand the following symbols & marks.

| ⚠Warning | Should the device be used without following these symbols, there is a possibility of accidents, such as a death or a serious injury, occurring. |

| ⚠Caution | Should the device be used without following these symbols, there is a possibility of accidents, such as a injury [*1], and material damage [*2] occurring. |

*1 "Injury" indicates injury, burn and electric shock, or the like which does not require hospitalization or the extended hospital visit.

*2 "Material damage" indicates damage related to a house, a building, furniture, apparatus, livestock or a pet.

🚫 Prohibition   ❗ The necessary

⚠ Warning
🚫 ● Do not disassemble, modify or repair the line monitor   This may result in an injury, electric shock, and ignition.
🚫 ● Do not put the analyzer in fire or heat them.   This may result in a injury and fire due to overheating or explosion.
🚫 ● Do not use the line monitor if there is inflammable gas.   This may result in ignition and explosion.
❗ ● Turn off the power of analyzer and unplug the cables immediately when emanating smoke, odor or sound.   Continuous use may result in an electric shock, injure or ignition.
🚫 ● Turn off the power and unplug the line monitor immediately when liquid or foreign substance gets into the line monitor.   Continuous use may result in ignition, electric shock and malfunction.

	⚠ Caution

⃠	● Do not touch the line monitor with wet hand. 　　This may result in an electric shock and malfunction.
⃠	● Do not give a strong impact on the product, such as dropping and crashing.
⃠	● Do not leave the analyzer in the following conditions. 　　Strong magnetic field, static electricity or dusty place. 　　・Temperature and humidity above the specification or where dew condensation appears. 　　・Not flat, or shaking place. 　　・Place with leaking water or electricity. 　　・Place affected by direct sun or near the fire. 　　📄　Please do not leave the analyzer in the car during the summer.
⃠	● Do not use at the following situations. The radio wave by the analyzer may cause trouble. 　　・Near a medical device such as cardiac pacemaker or hearing aid. 　　・Near an automatic controller such as fire-alarm box or automatic door. 　　・Near a microwave, high-level electronics, TV, or radio. 　　・Near a wireless station for mobile communications or a specified low power radio station.

CONTENTS

Chapter 1 Before Using the Product

1.1 Description on This Manual

📖 Printed representation

■ Printed representation of screen displays in the manual may not be the same as that actually displayed concerning the font and special symbols.

■ Descriptions of items of the screen are enclosed in double quotation marks " ".

■ Blinking of cursor is not described on the manual.

📖 Description of the Operating Procedure

■ Represent keys and items of the screen are enclosed in [   ].
  e.g. Press " Menu " key. -> Press [MENU].

■ Successive key operations are represented by putting their symbols one after another.
  e.g. : Press [MENU], then touch [System setting].
      -> [MENE],[System setting].

■ Pressing two keys at the same time is represented by "+". e.g. [A]+[B]

■ Touching the screen is described as "Touch" or "Tap".

■ Touching and sliding the finger to scroll data is described as "Swipe".

■ Unnecessary explanation may be omitted.
  e.g. :. Touch current selection and select other item to change.
      -> Touch current selection and change it to other item.

1.2 Unpacking

📖 When you unpack the product, make sure of the following

■ The product has not been damaged during the transit. There is not any defect on the appearance.

■ You have received all the standard accessories listed below.

    ・ Interface board   1
    ・ DB9 Monitor cable   (LE-009M2)   2
    ・ 3-line Probe cable   (LE-3LP)   2
    ・ 8-line Probe cable   (LE-8EX)   1
    ・ Instruction manual (This book)   1
    ・ Customer card / Warrant   1
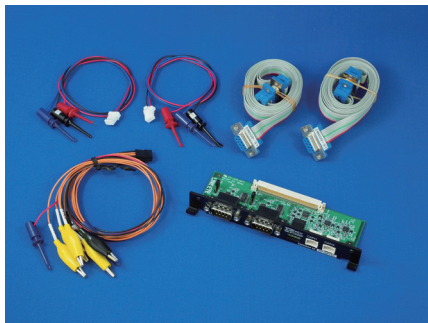
Please contact your LINEEYE distributors if you find any damage to the product caused by transportation, or if there are accessories lacking.

1.3   Functions and Feature

OP-SB7XC is an interface expansion kit for LE-2500XR/LE-3500XR and measures CAN (ISO 11898-1), CAN FD (ISO 11898-1:2015) and CXPI (JASO D015). It helps developing communication system, inspection and communication trouble shooting.
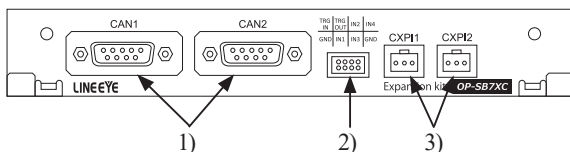
Function

◆ On-line Monitor Function
Monitor transmission/reception data at real time, and analyzes protocol and communication errors etc.

◆ Simulation Function
The analyzer becomes a counterpart of the target device and tests transmission/reception data.

Features

・ Support CAN FD (ISO 11898-1:2015) at 20kbps ～ 5Mbps.

・ Support CAN (ISO 11898) at 20kbps ～ 1Mbps.

・ Support CXPI (JASO D015) at 5kbps ～ 20kbps.

・ Record digital/analog value of 4 external inputs along with measured data.

・ Monitor only effective data by ID filtering.

・ Find specific data by powerful trigger function.
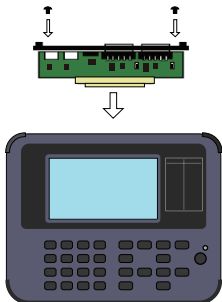
1.4   Panel Description

	Name	Function
1)	DSUB 9pin connector	Measurement port for CAN/CAN FD
2)	Header 8pin connector	External input/output port
3)	Header 3pin connector	Measurement port for CXPI

→ 9.2 Measurement port signal definition

Chapter 2 Basic Operation

2.1　Preparation

＜ Insert the interface board ＞

Exchange the standard interface board to OP-SB7XC.

    1)Turn off the analyzer.

    2)Screw off M3 screws on the interface board of analyzer.

    3)Take the board off pulling the handles of the interface board.

    4)Insert the interface expansion board (OP-SB7XC) into the slot completely.

    5)Screw it on using M3 screws.

When the analyzer is turned on the power, pre-installed firmware "OP-SB7XC" is started.

    📄 Please check the latest firmware from LINEEYE web page. To update the firmware, download the latest firmware "opsb7xc_fw2_vxxx" and software for transferring firmware "LE8FIRM V1.10 or later".

    →　https://www.lineeye.co.jp/index.html

    →　Please refer to the manual of "software for transferring firmware" for more details.

2.2 Connect to the Target Device

It is possible to select 2 measuring channels of separately from CAN FD/CAN or CXPI.

Connect Ch1 to the port of CAN1 or CXPI1, and Ch2 to the port of CAN2 or CXPI2, using the cables for CAN or CXPI attached to the product.
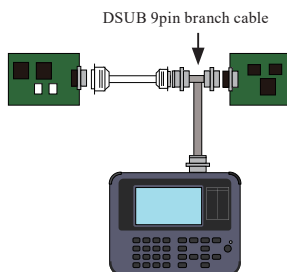
- ■ Online Monitor

  It is able to measure 2 channels simultaneously. Select CAN1 (CAN FD/CAN) or CXPI1, and CAN2 (CAN FD/CAN) or CXPI2.

- ■ Simulation

  Select 1 port from CAN1, CAN2, CXPI1 and CXPI2.

＜ For CAN/CAN FD ＞

Use DB9 Monitor cable for CAN/CAN FD communications.

DSUB 9pin branch cable
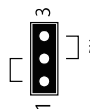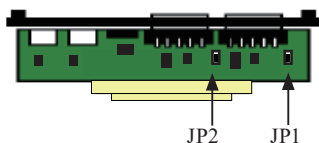
＜ Setting of Terminator ＞

The jumper pin makes it possible to connect the terminator in the CAN communications.

（Factory setting: terminator OFF）

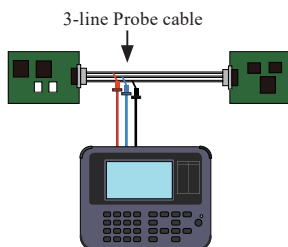JP1 (1-2 short): Connect the terminator (120 Ohm) to CAN1 port.

JP2 (1-2 short): Connect the terminator (120 Ohm) to CAN2 port.

JP2   JP1

< For CXPI >

Pick the target signals using the IC clips of 3-line probe cable.

The correspondence of the lead wires and I/O signals is described below.

3-line Probe cable

Color of the lead wire	Signal	Meaning
red	Vbat	Battery power supply (9 ~ 18V)
blue	CXPI Bus	CXPI bus signal
black	GND	Signal ground

Supply : Vbat from external device.
（analyzer does not supply）

< External and trigger I/O >

The analyzer has the external I/O terminals besides the interfaces of CAN/
CAN FD and CXPI.

They are for analog/digital input and the trigger I/O. Use the attached
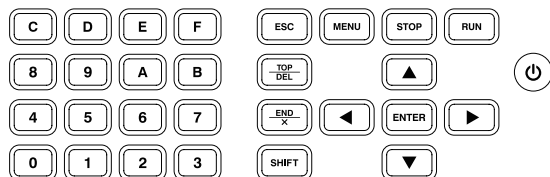8-line probe cable.

⑦ ⑤ ③ ①
⑧ ⑥ ④ ②

Pin number	Signal	Description
1	IN4	Digital/Analog input4
2	GND	Signal ground
3	IN2	Digital/Analog input2
4	IN3	Digital/Analog input3
5	TRG OUT	Trigger output
6	IN1	Digital/Analog input6
7	TRG IN	Trigger Input
8	GND	Signal ground

2.3 Operation

Touch panels enable to select settings by soft touch or to scroll the display by swipe.

■ Operation keys

C	D	E	F		ESC	MENU	STOP	RUN
8	9	A	B		TOP/DEL		▲		⏻
4	5	6	7		END/X	◀	ENTER	▶
0	1	2	3		SHIFT		▼

Operations	Function
[⏻]	Turn ON/OFF the power. Press it longer to turn off the power.
[RUN]	Start monitoring, measuring or testing operation.
[STOP]	Stop monitoring, measuring or testing operation.
[MENU]	Return to the top menu.
[ESC]	Return to the previous display Stop renewing data display while measuring.
[▲] , [▼]	Scroll one data line. Move the cursor on the condition setting.
[◀] , [▶]	Scroll one character of data. Change the setting on the condition setting.
[ENTER]	Apply selected settings.
[0] ∼ [F]	Enter numerical values. Select send data.
[TOP/DEL]	Jump to the top of data. Delete the entry indicated by the cursor.
[END/X]	Jump to the end of the screen. Enter the data of "Don't Care".
[SHIFT]	Press to use the expanded alternate function of each key.
[SHIFT]+[ESC]	Save the screen image to the storage device.
[SHIFT]+[RUN]	Brighter the LCD back light.
[SHIFT]+[STOP]	Darker the LCD back light.
[ENTER]+[TOP/DEL]+[⏻]	Initialize settings. Clear all.
[SHIFT]+[STOP]+[⏻]	Start the firmware loader.

* [X]+[Y] indicates the operation of pressing [X] and [Y] together at the same time.

■ Shortcut keys

By pressing [0] to [E] after [MENU], you can move to the frequently used setting screen.

Shortcut key	Setting display
[MENU] and [0]	Ch1Configuration
[MENU] and [1]	Ch2Configuration
[MENU] and [2]	Trigger
[MENU] and [3]	Record Control
[MENU] and [4]	Waveform monitor setting
[MENU] and [5]	Interface/Function
[MENU] and [8]	Request ID table selection
[MENU] and [9]	Send data table selection
[MENU] and [A]	CXPI simulation setting
[MENU] and [C]	File control/Action mode
[MENU] and [D]	System setting
[MENU] and [E]	Clock setting

📄 If the transition destination setting screen is not valid for the current function or operation mode, the operation will be ignored.

2.4 Line State LED

Relationship between line state LEDs and signals.

LED	Signal	Level	Light
SD	Ch1data	Dominant	Red lighting
		Receptive	OFF
RD	Ch2data	Dominant	Red lighting
		Receptive	OFF
RS	Ch1 VBAT	About 8.0V or more	Red lighting
		About 4.3Vor less	OFF
CS	Ch2 VBAT	About 8.0V or more	Red lighting
		About 4.3V or less	OFF
DR	IN1	About 2.0V or more	Red lighting
		About 1.0V or less	OFF
CD	IN2	About 2.0Vor more	Red lighting
		About 1.0V or less	OFF
CI	IN3	About 2.0Vor more	Red lighting
		About 1.0V or less	OFF
ST2	IN4	About 2.0Vor more	Red lighting
		About 1.0V or less	OFF

Chapter 3 Basic Configuration

3.1 Top Menu

Press [Menu] to set basic configuration.

Interface/Function : Select the interface and operation mode.

CH1 configuration : Set the communication conditions of CH1.

CH2 configuration : Set the communication conditions of CH2.

Trigger : Set the trigger factor and action. Set the timer/counter for trigger.

Record control : Set the capture buffer, recording type of external input, and auto save.

Wave monitor : Set the sampling clock for wave monitor.

Touch each item on the screen or select by [▲] , [▼]and press [ENTER].

   📄 Touch [System settings] to set power saving mode, battery charging type, and version information.

   📄 Touch current time on the right bottom of screen to correct the time.

3.2 Interface and Operation Mode

From top menu, touch [Interface/Function].

Select the interface and operation mode of analyzer.

■ CH1 Interface
   Select "CAN" when analyzer uses
   CAN1 port for CH1, or "CXPI"
   when it uses CXPI1 for CH1.
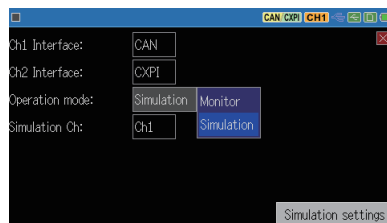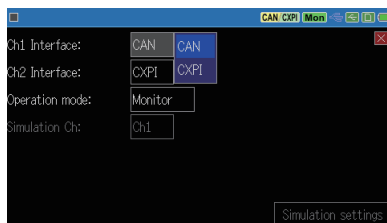

■ CH2 Interface
   Select "CAN" when analyzer uses
   CAN2 port for CH2, or "CXPI"
   when it uses CXPI2 for CH2.

■ Operation mode
   Select an operation mode from
   Monitor or Simulation.

■ Simulation CH
   Select a port for simulation from CH1 or CH2.

Touch "Simulation settings" on the right bottom of screen for advanced
settings.

   📄 It is able to respond ACK as a CAN node for any port including unselected
       ports for Simulation. Press [SHIFT]+[A] on above screen.

                                        → Chapter 5 Simulation Function
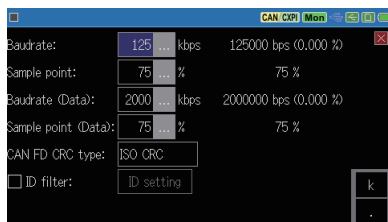
3.3　Communication Conditions

From top menu, touch [CH1 configuration], [CH2 configuration].

＜ For CAN/CAN FD ＞

■　Speed
Touch […] to select the preset speed. For CAN FD, set "Baud rate (data)" as well.
To input the baud rate manually, touch the current baud rate. On the right side of inputted baud rate, the actual baud rate and tolerance are displayed.

📄　The actual baud rate is the closest baud rate which the circuit is able to measure. If the tolerance is high, the analyzer may not able to monitor accurately.

■　Sample point
Set the bit sample point between 60% ～ 90%. On the right side of inputted sample point, the actual sample point is displayed.
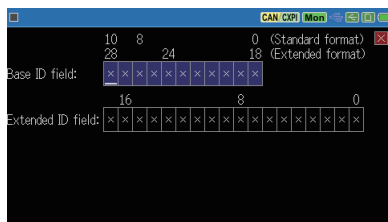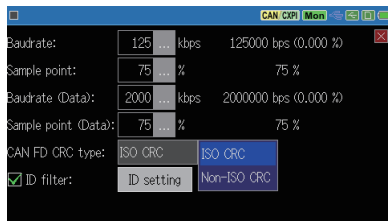For CAN FD, set "Sample point (data)" as well.

■　CRC type
For CAN FD, select "ISO CRC" or "non-ISO CRC".

■　ID filter
Mark on the box of "ID filter" and touch [ID setting]. Set the ID in binary or with "don't care" in [X].

< For CXPI >

■ Speed
Touch […] to select the preset speed or input baud rate manually.

■ ID filter
Mark on the box of "ID filter" and touch [ID setting]. Set the ID in binary or with "don't care" in [X].

3.4 Record control and J1939

Press [MENU] and touch "Record control" to set additional information, capture buffer, auto save and auto run.

📄 It consumes 32 ～ 384byte of memory to save one frame.

📄 Setting items of capture buffer, auto save and auto run are same as standard firmware. Please refer to the instruction manual for analyzer.

Press a tab of additional information and set time stamp and sampling interval for external input and J1939.

[Time stamp]
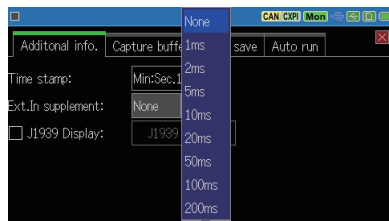Select a unit of time stamp from H:M:S, M:S:1ms, 100μs, 10μs and 1us.
The unit of 100μs, 10μs and 1μs are the elapsed time from start of the measurement.
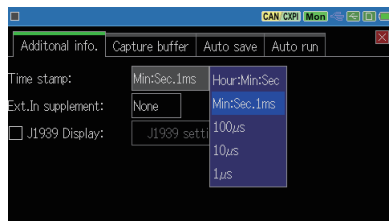
[Ext.In supplement]
Select the sampling interval (1ms ～ 10s) of external inputs (TRG IN, IN1 ～ IN4).
It records the analog/digital value of external input at selected interval.

Only time stamp of H:M:S and M:S:1ms are available while it uses the sampling interval.

[J1939]

It is able to translate a part of parameter which is defined in SAE J1939-71 (Rev.2003-12).

Touch [J1939 setting] and set max. of 5 data.

■ Target channel

Select a target channel to translate into J1939.

■ PGN/SPN/Src

PGN

　PGN (Parameter Group number)
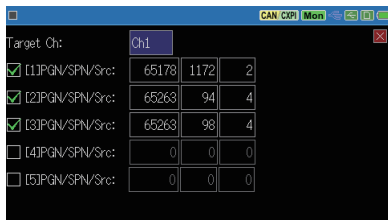
　Input PGN in decimal.

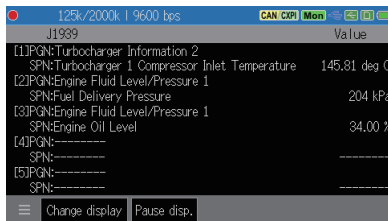SPN

　SPN (Suspect Parameter Number)

　Input SPN in decimal.

Src

　Input source address in decimal.

Touch [Change display] for some times to change to J1939 display. Only latest data will be translated into J1939.

Chapter 4 Monitor Function

4.1 Monitor Function

The monitor function records measured data in the capture buffer without impacting on a communication channel. Not only communication data but also the time stamp, external analog signal, signal status of external trigger are recorded. Trigger function helps finding data at specific conditions. And, retrieval function and scrolling display helps analyzing efficiently in the vast array of data in the capture buffer.

4.2 Start Monitoring
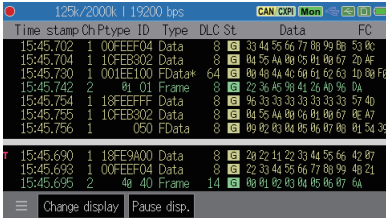
📖 Setting and Connection

Select "Operation mode: Monitor" and confirm the communication conditions. Connect the analyzer and target device.

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→ 2.2 Connect to the Target Device
→ 3.2 Interface and Operation Mode
→ 3.3 Communication Conditions

📖 Start Monitoring

Press [RUN] and " 🔴 " will be displayed on the upper left on the screen. Monitored data is displayed on the screen at real time and recorded in the capture buffer.

📖 Pause Display

Press [ESC] or touch " Pause" , then the motion on the screen temporarily seems to be stopped while measurement is still continuing. While it stops renewing the display, "Pause" is displayed in green color.
In order to cancel this, press [ESC] or touch "Pause" to go back to normal display.

4.3 Data Display
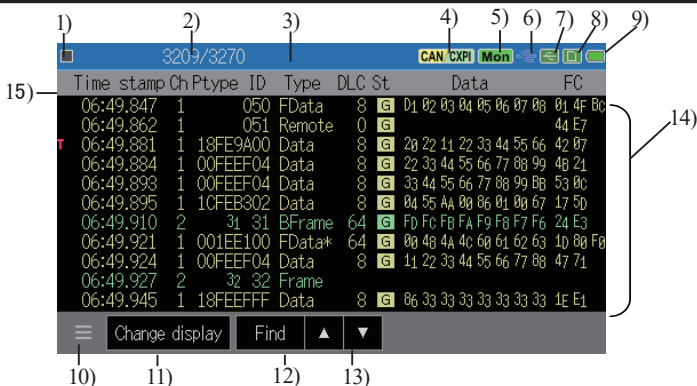
| 1)	Measuring 〔 🔴 〕,Pause 〔 🔲 〕
2)	Current data position/Total data. Position setting.
3)	Others
4)	Ch1 protocol/ Ch2 protocol

5)	Selected function
	  Mon : Monitoring
	  CH1 : Simulating on Ch1
	  CH2 : Simulating on Ch2

6)	Status of USB device port (Bright: Connected)
7)	Status of USB host port (Bright: Connected)[*1]
8)	Status of SD card slot (Bright: Connected) [*1]
9)	Level of remained battery. 〔 ⚡ 〕 indicates " USB bus power"
10)	Setting items
11)	Change display mode. Measured data=>Analog data of external input=>JJ1939 parameter[*2]=> Wave monitor [*2]
12)	Pause display (available while it is measuring) Search data (available while it is not measuring)
13)	〔 ▲ 〕: Search backward (old) data, 〔 ▼ 〕: Search forward (new) data.
14)	Display for measured data
15)	Display items of measurement data Touching [Time stamp] displays the time difference from the previous frame (△ Time stamp)

* 1 : Color in red while analyzer is accessing to the storage device.

* 2 : It is available only the function is selected.

📖 Change Display Format

Touch [Change display] on the bottom of screen and change display format. (measured data -> analog data of external input)

[Frame display of CAN/CXPI 」   [Analog/distal display of external input]

📖 Display Data After Measurement

After the measurement, it displays Ch1 data in yellow, Ch2 data in green and external input data in white. If the data field of CAN FD/CXPI contains more than 8byte, it will display the rest of data in the following line.

Display	Description
Time stamp	Display the time of received frame. (unit: H:M:S, M:S:1ms, 100us, 10us or 1us)
	" 🔳 " indicates that it matched with trigger factor.
Ch	Display received channel.
ID	For CAN, it displays ID of received frame.
	For CXPI, it displays the ID excepting a parity and PID in HEX for event trigger type. Or, it displays PTYPE and PID value in HEX for polling type. (e.g. 00 01 01)

Display	Description	
Type	Display a type of received frame.	
	Data	Data frame
	Remote	Remote frame
	Error	Error frame
	FData	BRS=0, ESI=0 of CAN FD frame
	FData!	BRS=0, ESI=1 of CAN FD frame
	FData*	BRS=1, ESI=0 of CAN FD frame
	FData*!	BRS=1, ESI=1 of CAN FD frame
	Frame	CXPI normal frame
	BFrame	CXPI burst frame
	Wake up	Wake up pulse of CXPI [1]
	Illegal	Illegal frame of CXPI
	----	Interval for external input
DLC	Display data length code in decimal.	
St	Display normal or abnormal of a frame.	
	G	Normal frame
	A	ACK error of CAN / CAN FD
	F	Form error of CAN / CAN FD
	C	CRC error of CAN / CAN FD / CXPI
	E	Error frame of CAN / CAN FD
	P	Parity error of CXPI
	L	Length error of CXPI
Data	Data field value (in HEX)	
FC	CRC value in HEX	
IN1 ∼ IN4	Voltage of external input	
T1234	Status of external trigger and trigger input 1 ∼ 4. (0: Low, 1:High)	

[1] : "Wake up" may be displayed when it starts CXPI monitoring without

supplying a bus clock and then changes to supplying a bus clock.

Others

96 : (Data in HEX in red) Framing error.

Overrun : Unable to process.

Lost data : Lost data: Lost data.

📖 Stop Monitoring

Press [STOP] to stop monitoring and " ■ " is displayed in the upper left of screen.

📄 Also, it stops monitoring when the trigger condition is satisfied or capturing buffer becomes full.

→ [MENU],[Record control],[Capture buffer]
→ Chapter 6 Trigger Function

📖 Scroll and Jump

■ Scroll

You can scroll the display of send/receive data by swiping up (new data direction) or down (old data direction) by your fingertip.

■ Jump

Touch[☰]in the left bottom and select "Set position". Type the positioning number using [0]-[9] keys and touch "To Specified" to see the specified data.
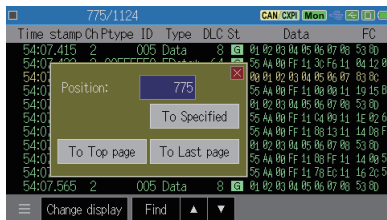
■ Mark & Jump

It is able to mark 5 positions of data and jump to the positions.
It is able to display marked position directly.

Place the data to be marked on the top of the screen.
Touch [☰]->"Set to marker".
Select the marker from Marker0 to Marker4.
The top of current position is displayed after the marker number.
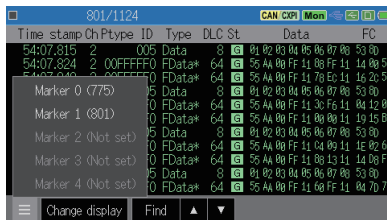
To go to the marked position, touch "Move to marker", and select the marker number.

📄 Information of position marker will be saved with measured data.

📄 Information of position marker will be deleted after reading data files, restarting measurement and power off.

4.4 Retrieval Function

Retrieval function allow you to find a specific data from a vast array of data. Also, it is able to count the number of matched data with specific conditions.

📖 Retrieval Condition

Touch "Retrieval" in the bottom of screen which displays the measured data.

Touch [Find factor] and select the conditions
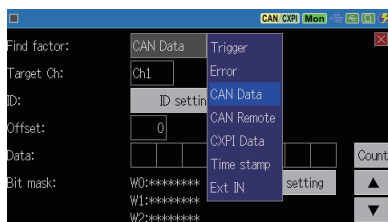
Trigger[*1]	Retrieve matched data with trigger factor.
Error	Various error.
CAN data [*2*3]	Retrieve specific CAN/CAN FD frame.
CAN remote [*2]	Retrieve specific CAN remote frame.
CXPI data [*2*3]	Retrieve specific CXPI frame.
Time stamp [*4]	Retrieve data of specified time.
Ext IN [*2]	Retrieve status of specific external input.

*1 : Cannot retrieve data when " Timer/Counter "is the trigger factor.
*2 : It is able to use "don't care" (X).
*3 : It is able to use bit mask (W0, W1, W2).
*4 : Cannot retrieve the elapsed time stamp.

Touch [▲] or [▼] to start the retrieval and matched data is displayed on the top of screen.

Touch "Count" on the right side of screen to count the number of matched data.

-23-
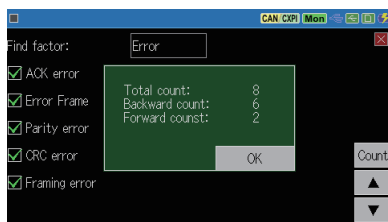
📖 Start Retrieval

Touch [▲] or [▼] to start the retrieval.

[▲] : Retrieve backward (older) data, starting from the top of data
         displayed on the screen.
[▼] : Retrieve forward (newer) data, starting from the top of data
         displayed on the screen.

Matched data is displayed on the
top of screen.
"Not found" is displayed if there is
no matched data.
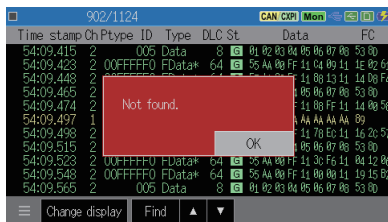
Chapter 5 Simulation Function

5.1 Simulation Function

Simulation function is the tool that makes the analyzer operating as a communication partner with a teste device, and that executes a test for transmission and reception. Even if communicated devices are not prepared at the first step in developing, the testing like real operation will be able to be executed. It is able to transmit test frames of CAN/ CAN FD and CXPI.

5.2 Registration of the send frames

Register transmission test frames before starting simulation.

＜ CAN/CAN FD ＞

From top menu, touch "Interface/ Function". Select "Simulation" for "Operation mode", and "Ch1" or "Ch2" for "Simulation Ch".

Touch "Simulation settings" on the bottom of screen and register transmission tables.

It is able to register 16 transmission tables (No.0 ～ F). Touch the table No. to register data on that table.
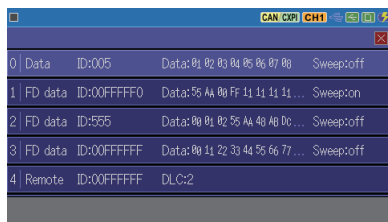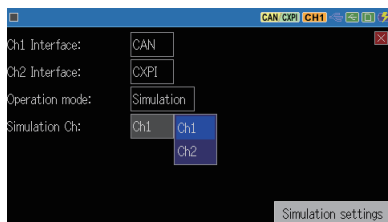
■Frame type

For CAN, select from "Data (Standard)", "Data (Extended)", "Remote (Standard)", or "Remote (Extended)".

For CAN FD, select from "FD (Standard)" or "FD (Extended)".
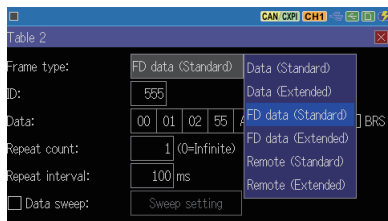
■DLC

For remote frame, set the data length with 0 to 8.

■ID

Set ID in HEX.

■Data

Set data in HEX. If "Frame type" is selected as "FD data", data inputting window will be displayed.
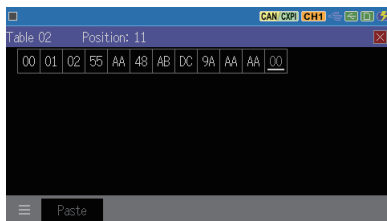
■BRS

Mark on the box if the speed of data field needs to be changed.

■Repeat

Set the number of times of sending frames. Set "0" to send repeatedly.

■Interval

Set the interval of sending frames between 1 ～ 99999ms.

　📄　There is an error of about 2 ms.

■Data sweep

Mark on the box for sweep operation.
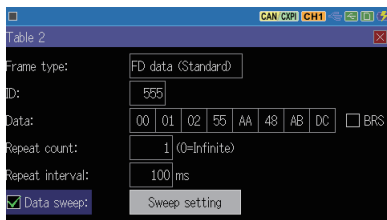
→ 5.3 Sweep

＜ CXPI ＞

From top menu, touch "Interface/Function". Select "Simulation" for "Operation mode", and "Ch1" or "Ch2" for "Simulation Ch".

■CXPI simulation mode

Select "master" or "slave".
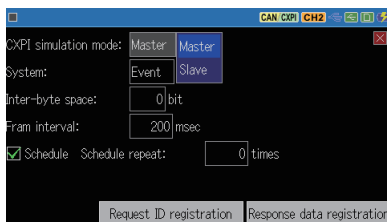
■Type

Select access type from "event" or "polling".

■Inter byte space

Set the interval of bytes between 0 ～ 99bit.

■Frame interval

Select interval of sending request ID between 25 ～ 9999ms when the schedule transmission function is ON. Set the longer time than frame length.

■Schedule

Mark on the box to send effective ID in the request ID from smaller table number (table0) automatically. Also, it is possible to send the effective ID manually by pressing the corresponded keys. This function is only available for master mode.

■Repeat

Set the number of times to repeat the schedule sending.

＜ Register request ID ＞

Touch ［Request ID registration］ and register 16types of request ID. (No.0 ～ F)
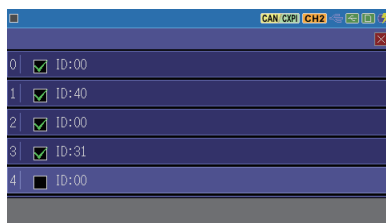
Touch the request ID table and data inputting window is displayed.

■Enable

Mark on the box to send the request ID.

■ID

Set the ID (00 ～ 7F) in HEX. Set "00" to send PTYPE.

Analyzer acts as follows from each setting.

Simulation mode	Method	Schedule	Action
Master	Polling	□	Transmit the valid ID by pressing a corresponded key with the request ID table.
		☑	Transmit the valid request ID automatically.
	Event	□	Transmit the valid ID by pressing a corresponded key with the request ID table.
		☑	Transmit the valid request ID automatically.
Slave	Polling	□	When PTYPE is received, it automatically transmits the valid request ID in ascending order of table number.
		☑	
	Event	□	Transmit the valid ID by pressing a corresponded key with the ID table.
		☑	Transmit the valid request ID automatically.

＜ Register response data ＞

Touch ［ Response data registration ］ and register 16 kinds of response data table.
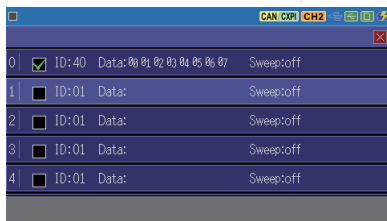
■ID

　Set the response ID in HEX.

■Enable

　Mark on the box to send the response data automatically when the received ID is matched.
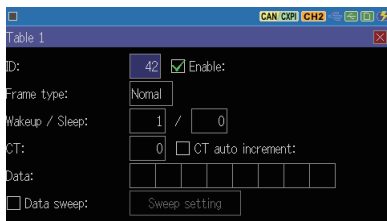
■Frame type

　Select the frame type from "normal" or "burst".

■Wakeup / Sleep

　Set the "Wakeup.ind" and "Sleep.ind" with 0 and 1.

■CT

　Set the counter value which represents the continuity of frame from 0 〜 3.

■Data

Touch it to display the data input screen. Enter the transmission data in hexadecimal. When Normal is selected at the "Frame type" setting, the 14th and subsequent bytes are not transmitted.
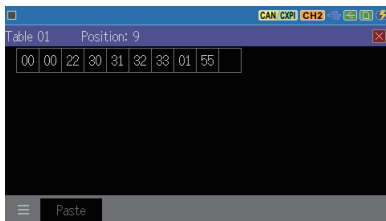
■Data Sweep

Mark on the box to make a sweep operation.

→ 5.3 Sweep

< Edit Data Table >

There are some editing tools for registering the data tables.

■Data Fill

Touch[▤]in the data inputting window and select "Fill data". Set "Begin data", "End data" and "Fill size".
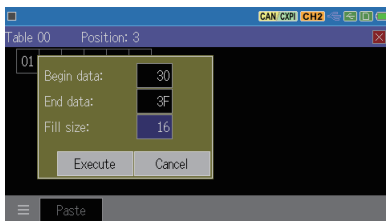
(e.g.) Begin data: "30", End data: "39", Fill size: "255"
Data of 30h ～ 39h is inputted repeatedly for 255 bytes in the table.

■Select mode

By touching [Select mode] of[▤]at the data input screen, the data at the cursor position is selected. By dragging or cursor keys determine the range for copy or cut, touch [Copy] [Cut] and then touch

[Paste] to insert the data of the selected range to the cursor position.
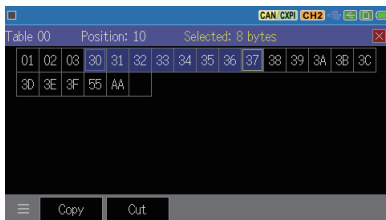
5.3 Sweep

Touch [Sweep setting] and set each parameter.

■Sweep size :

Select data size to sweep from 8 or 16bits.

For 16bits, select the endian from big or little.
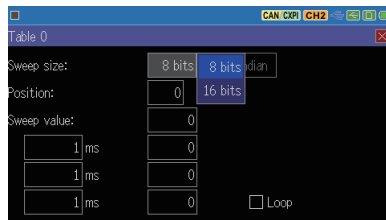
（e.g) Set "0123h"

Little endian | 23 | 01 |

Big endian | 01 | 23 |

■Position

Set the position of data field where sweep data is going to be inserted from 0 ～ 7 for CAN, 0 ～ 63 for CAN FD, 0 ～ 254 for CXPI

（e.g.) Size: 16bit, Position: 2

Two data in grey color is inserted. Other data are the one set on "Data" field.

■Sweep value

On the first box, input the initial value in decimal.

On the second box, input first target value and time (ms).

On the third box, input the second target value and time (ms).

On the fourth box, input the third target value and time (ms).

Press [±] to change positive/negative value. To input the negative value, input value in complement notation of 2.

In the example of setting, it increases 100 after 1 second and decreases -127 after 2 seconds, and increase 100 after 0.5 second.

Mark on the box of "Loop" to repeat the sweep.
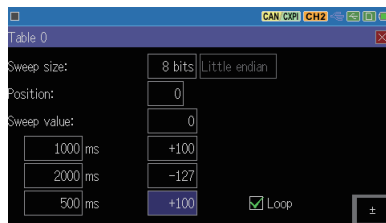
5.4 Start Simulation

📖 Setting and Connection

Setting and Connection
Confirm the measurement port, communication condition and simulation setting.
Connect the analyzer and target device.

→ 2.2 Connect to the Target Device
→ 3.2 Interface and Operation Mode
→ 3.3 Communication Conditions

📖 Start Simulation

Press [RUN] and it waits for test data sending from analyzer. " 🔴 " is displayed on the upper left of screen.

＜ CAN / CAN FD ＞

Press [0] ～ [F] to send the test data. Press the same number to stop repeating of transmission. It is able to send the new data table while it sends the specific data table repeatedly.

＜ CXPI ＞

■Master mode (polling type)

If the schedule is valid, it sends PID set in the request ID table automatically. If it receives matched ID with effective data on the response data table, it sends response data from analyzer.

（e.g.)Register 00, 01 in the ID table.

<=	[PTYPE]	[PID 01]	: Analyzer（ID table)
<=		[DATA]	: Analyzer（Response table)
<=	[PID]		: Node
<=	[DATA]		: Node

Analyzer sends PTYPE and slave node is able to send specific PID.

Slave node sends PID.

The node matched with ID sends response data.

When the time set in the frame interval passed, analyzer sends PID=01, and

matched node sends response data.

If the schedule is invalid, press [0] ～ [F] to send PID.

■Master mode (event trigger type)
If the schedule is valid, it sends PID set in the request ID table automatically. If it receives matched ID with effective data on the response data table, it sends response data from analyzer.

(e.g.) Register 01, 02, 03 in the ID table and ID=2 in the response table.
```
<=  [PID 01]        [PID 02]         [PID 03]        : Analyzer (ID table)
<=          [DATA]                        [DATA] : Node
<=                        [DATA]                       : Analyzer (Response table)
```

Analyzer sends PID=01, PID=02, PID=03 with the frame interval and each slave node responses. When the analyzer receives PID=02, data on the response table is sent automatically.

If the schedule is invalid, press [0] ～ [F] to send PID.

■Slave mode (polling type)
Analyzer sends PID set in the request ID table automatically after receiving the PTYPE. Analyzer sends response data when it receives the matched ID with effective data on the response data table.

(e.g.) Register 01, 02 in the ID table and ID=2 in the response table.
```
<=  [PTYPE]               [PTYPE]                   : Master
<=          [PID 01]               [PID 02]       : Analyzer (ID table)
<=              [DATA]                    : Node
<=                                   [DATA] : Analyzer (Response table)
```

When the analyzer receives PTYPE from master, it sends ID=01, ID=02 from ID table automatically. When the analyzer receives PID=02, it sends data on the response table automatically.

■Slave mode (event trigger type)

If the schedule is valid, it sends PID set in the request ID table automatically. If it receives matched ID with effective data on the response data table, it sends response data from analyzer.

(e.g.) Register 01, 02, 03 in the ID table and ID=2 in the response table.

<= [PID 01]   [PID 02]   [PID 03]   : Analyzer（ID table）

<=   [DATA]   [DATA] : Node

<=   [DATA]   : Analyzer（Response table）

    Analyzer sends PID=01, PID=02, PID=03 with the frame interval and each slave

    node responses. When the analyzer receives PID=02, data on the response table is

    sent automatically.

If the schedule is invalid, press [0] 〜 [F] to send PID.

■Wake-up signal

For slave mode, it is able to send wake-up signal by [END/X] key if there is no bus clock. Also, "Wakeup" will be displayed when it supplies bus clock after starting measurement without bus clock.

📖 Finish Simulation

Press [STOP] to stop measurement. "■"will be displayed on the upper left of screen.

Chapter 6 Trigger Function

6.1　Trigger Function

The trigger function is a function that triggers a special measurement process (action) by a specific condition (factor) such as the occurrence of a communication error during measurement. By controlling the timer/counter, it can measure the communication response time and count the number of occurrences of specific events. This is useful when analyzing the flow of communication under the specific interest.

6.2　External Trigger Input/output

It is able to use the signals from external device as trigger input, or send signals to an oscilloscope when receiving the signals (trigger output).

Pin No	Signal name		Note
7	TRG IN	External trigger input	Input with TTL level[※1]
5	TRG OUT	External trigger output	Output with open collector[※2]

 * 1 : +5V, 10KΩ with pull-up, input voltage range:-0.5V ∼ 6.0V

 * 2 : +5V, 10KΩ with pull-up, output L pulse for about 1ms when a trigger factor is satisfied.

📄　If one trigger factor is satisfied while the previous trigger is outputting L pulse, it will keep L level for about 1ms after the last trigger factor is satisfied.

▼ Trigger generated   ▼ ▼ ▼

About 1milli sec   About 1milli sec
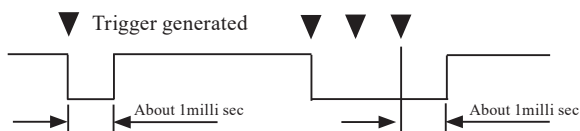
6.3　Trigger Settings

4 trigger factors and actions can be set.

Press [MENU] and touch "Trigger".
To make the trigger valid, mark on the box of trigger number
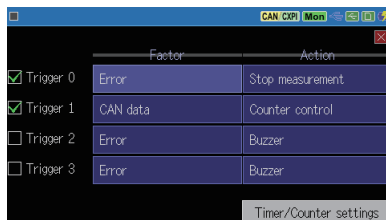
It is able to select "trigger control" (trigger valid/invalid) as a trigger action.
Touch on the setting of trigger factor and action and set.
To use the timer/counter for trigger function, set the timer/counter setting in advance.

📖 Trigger Factor

Select the trigger factors.

■ Error
    Select the error type from ACK error (CAN/CAN FD), parity error (CXPI), framing error (stop bit is dominant) or CRC error (CAN/CAN FD/CXPI).
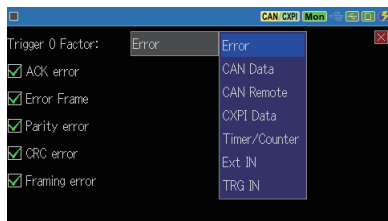
■ CAN data
    Set the data frame of CAN/CAN FD with ID and 8byte of data. Bit mask (W0, W1, W2) and don't care (X) can be set. For CAN FD, set the off-set position of data field
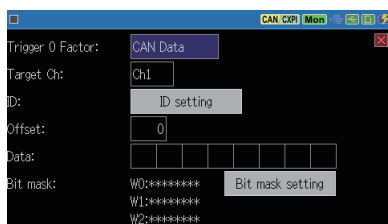
Touch "ID setting" to set target ID with don`t care (X).

■ CAN remote
   Set the remote frame of CAN. Touch "ID setting" to set target ID.
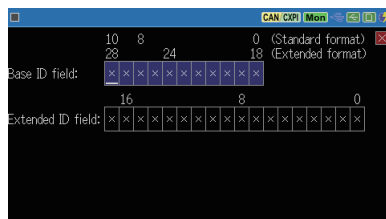
■ CXPI data
   Set the CXPI frame with ID and 8byte of data. Bit mask (W0, W1, W2) and don't care (X) can be set.
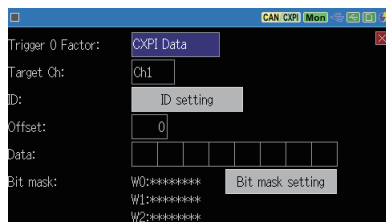
■ Timer/Counter
   Select the timer or counter.

   📄 Set the setting of timer/counter in advance.
         → 6.4 Timer/Counter Function
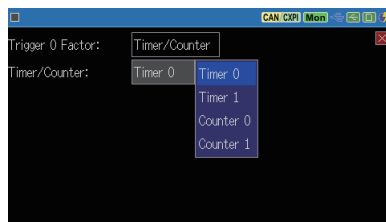
■ External input
   Select the logical status of external signal from 1(H), 0(L), X(don`t care).

   📄 All signals are AND condition. It is satisfied when the discordance condition becomes cordance condition.
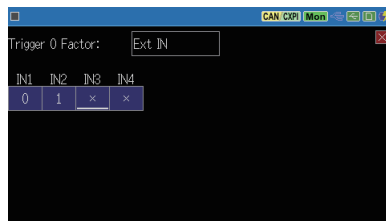
■ Trigger input
   Select the rising or falling edge of external trigger.

   📄 100μs or more holding time is needed.

📖 Trigger Action

Select the trigger action

■ Buzzer
The buzzer sounds for about 0.3 seconds

■ Stop measurement
Select how long the measurement continues after the trigger matching.

Quick : Immediately stops measurement

Before : Record 64KB of data after the trigger matching and then stops measurement.

Center : Record until the half of capture buffer and then stops measurement.

After : Record a lot of data after the trigger matching. (At least 64KB of data before trigger matching is saved.)
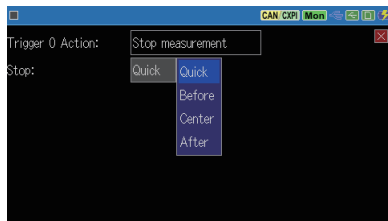
■ Save data
Select the number of data before trigger satisfaction (offset-) and after trigger satisfaction (offset+). Max 9999 data can be saved in the USB memory as "TGSAVEnn.DT" file. [*1]
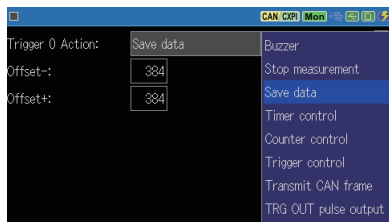
📄 While it saves data, the next saving operation is ignored. If the measurement stops during the saving process, that file is not saved.

📄 Since one frame is recorded by a variable length of 32 bytes to 384 bytes, when you want to save it including the frame where the trigger matches set "Offset-" to 12 or more. Also, set a large value for "Offset +". As the last saved frame can be in the middle of the frame, it may be displayed as "Lost data".

* 1 : File name "nn" is automatically named with 00 to 99. After 99, it will overwrite the file and go back to 00. Once the measurement ends, it will start over from 00 and the file is overwritten.

■ Timer control
Select the timer control from start, stop, or restart (from value 0).
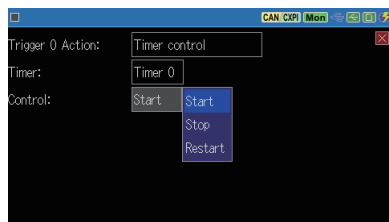
■ Counter control
Select the counter control from increment (+1), or clear (0).
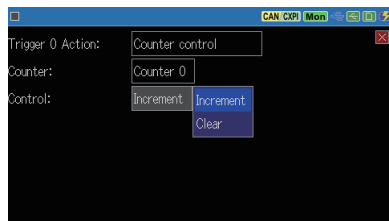
■ Trigger control
Select the trigger control from disable, enable, or change (reverse enable and disable).
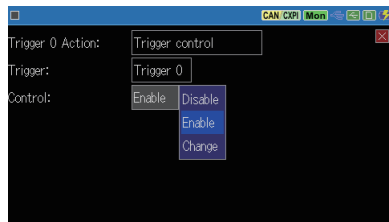
■ Transmit CAN frame
Transmit specified table after the selected "response time" (0 ∼ 99999ms). This is available only for CAN simulation.
→ Chapter 5 Simulation
Function
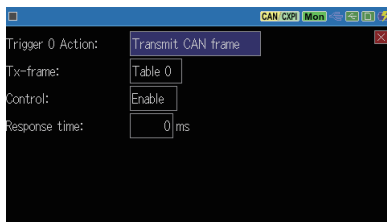
▤ Transmission process does not start until the previous transmission ends.

■ TRG OUT pulse output

Output low pulse for about 1ms to external trigger output (TRG OT).

6.4 Timer/Counter Function

The timer / counter function is used together with the trigger function. There are timer0/1, counter0/1 and frame counter to count frame of Ch1 or Ch2 for CAN FD/CAN/CXPI.

📖 Timer/Counter

■ Timer action of timer0/1

1) The timer is cleared to 0 at the start of measurement, and the status changes to stop.
2) When the trigger is satisfied, it starts, stops, or restarts as the trigger action. The timer starts with the selected resolution.
3) When the set value (comparison value) of timer 0, 1 and the current value of timer 0, 1 matches, that information is used as trigger factor.
4) If the current value overflows, it continues counting from 0.
5) When the measurement stops, the timer also stops at the point.

■ Action of counter0/1

1) The counter is cleared to 0 at the start of measurement.
2) When the trigger is satisfied, it is incremented (+1) or cleared as the trigger action.
3) When the set value (comparison value) of counters 0 and 1 and the current value of counters 0 and 1 matches, that information is used as the trigger function.
4) If the current value overflows, it continues counting from 0.

■ Action of frame counter (Ch1/Ch2)
   1) The frame counter is cleared to 0 at the start of measurement.
   2) It is incremented (+1) when it receives a frame (CAN FD/CAN/ CXPI). Max. is 4294967295.

📖 Timer/Counter Setting

Press [MENU] and touch "Trigger"->"Timer/counter setting".

Set each timer/counter with comparison values with 1 ～ 999999.
Select the resolution of timer from 100ms, 10ms or 1ms.
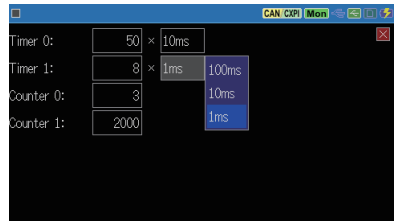
📖 Timer/Counter Display

After the measurement, touch [≡]on the left bottom of screen and select "Timer/Counter".

To hide this window, touch [≡]and select "Timer/Counter" again.

Chapter 7 Waveform Monitor

It is possible to measure the timing of change of the communication lines with a time resolution of up to 50ns and display it as a waveform like a logic analyzer do so.

📖 Setting

From top menu, touch "Wave monitor" and mark on the box of "Enable wave monitor".

■ Sampling clock
Select a sampling clock with 5 to 10 times faster than the target speed.

■ Trigger position
Select the trigger position in the waveform monitor sampling memory (2K sampling).
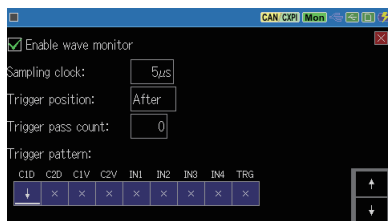
Select which part of the waveform measurement data, before or after the trigger, is prioritized.

    Before : Capture a lot of data before the trigger point (some after the trigger point) and then stop.

    Center : Stop at the point where before and after parts of the trigger are the same amount of data.

    After : Capture a lot of data from the trigger point and stop.

■ Trigger pattern
Set the status of signal lines to stop measuring of waveform automatically.

📖 Operation

1)   Press [RUN] to start measuring and waveform measuring.
2)   When a trigger factor is satisfied, 🎚 will be appeared on the upper left.
3)   Press [STOP] to stop measuring.

📖 Display

After measurement, touch "Change display" on the bottom of screen and display waveform.

Touch "scale-up" button or pinch out the screen to expand the screen. Swipe the screen to scroll the data.
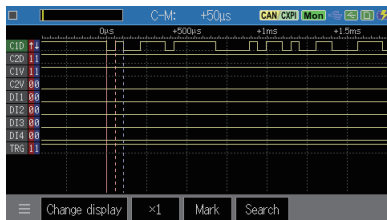
■ Time between two points

"C-M:" displays the time between the cursor and marker.

Move the cursor by [◀],[▶] and then press [ENTER] or touch "Mark" to use the marker.

Chapter 8 Save and Load the Data

8.1 File Management Function

Measured data and setting conditions can be saved in the storage device (USB flash drie or SD card). It is able to load and use the saved files.

[Attention]
Do not remove the storage device while the analyzer is accessing to the storage device. It will damage the data and also the storage device itself.

📄 While the analyzer is accessing to the storage device, following icons become in red.

Select the storage device from "Record control". Insert the selected storage device into the analyzer. Touch [File operation] from top menu.
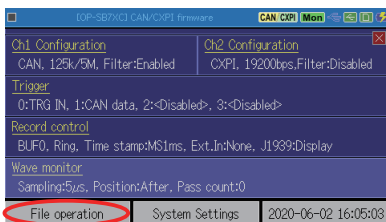
8.2 Save

To save measured data, touch [Save data] on the bottom of (file operation) screen.
To save setting condition, touch [Save setup] on the bottom of (file operation) screen.
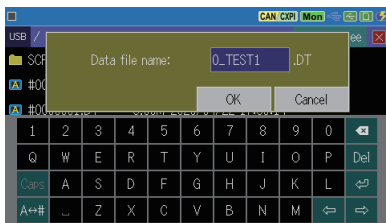
Name the file. Following extension name will be added automatically.

Measured dada   .DT
Setting data   .SU

Touch [OK]. When it finishes saving data, it will go back to file operation screen.

📄 If the saving data exceeds the amount of free space, it will display the error massage. In this case, delete the unnecessary data first and try it again.

8.3   Filter Function

Filter function selects specific files.
Touch [≣]on the bottom of file operation screen and select "Filter". Set the filter conditions.
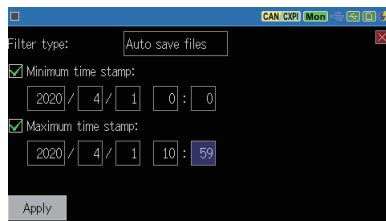
Filter type	Description
All file	All files
Data/Setup files	File extension is ".DT" and ".SU".
Data files	File extension is ".DT".
Setup files	File extension is ".SU".
Trigger save files	File name is "TGSAVEnn.DT" (nn=00 ～ 99).

Mark on "Minimum time stamp" to look for the files with time stamp after the selected time.
Mark on "Maximum time stamp" to look for the file with time stamp before the selected time.
Touch "Apply" and matched files will be displayed.

📖 Sort

Touch [≣] on the bottom of screen and "Sort". Select the conditions to sort files.
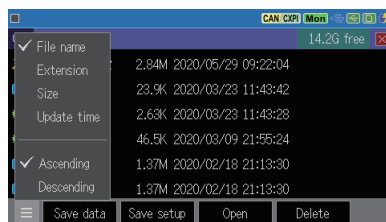
8.4 Load file

It is able to load ".DT" and ".SU" files.

Select the target file from file operation screen and touch "Open".
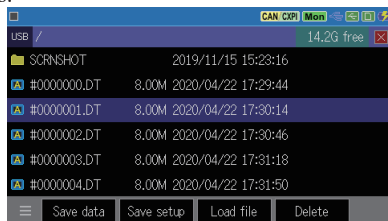
☰ When the selected file is loaded, measured data is overwritten on the capture memory.

📖 Change file name

It is not possible to change the file name directly. Load the file first then save it with different name.

8.5 Delete

Select the target file from file operation screen and touch "Delete".
Select "OK" to delete or "Cancel" to cancel.

Chapter 9 Documents

9.1   Specifications of Function and Hardware

Item		OP-SB7XC
Applicable analyzer		LE-2500XR/LE-3500XR
Interface	CAN CAN FD	ISO11898/ISO11898-1:2015 Dsub 9pin connector (female)x2
	CXPI	JASO D 015-3:2015 Header 3pin connector x2
Transceiver	CAN CAN FD	MCP2542FD（Microchip）or equivalent
	CXPI	BD41000AFJ（Rohm）or equivalent
Channel		2 channel of combination of CAN FD/CAN/CXPI.
Communication speed	CAN	20kbps ～ 1Mbps
	CAN FD	20kbps to 1Mbps. 1Mbps to 5Mbps for the data field when BRS is on.
	CXPI	5kbps ～ 20kbps
Capture memory		100M bytes, 2 divided use is available. By the Auto Save function it can records data up to 32GB to an external storage.
Monitor function		Displays and records communication frame ID, type, content, error, and CRC ID filter for each channel (bit mask can be specified) CAN/CAN FD sampling point (60%-90%) setting
Time stamp		Time resolution: Hour/minute/second, minute/second/1ms, 100μs, 10μs, 1μs (100μs, 10μs, 1μs is elapsed measurement time, max 134,217,727)
Simulation function		Transmit pre-registered test frames by key operation.Increase/decrease data in the appointed position in a frame (sweep) CAN/CAN FD : Respond to a specific frame, using trigger function. CXPI : Scheduled transmission in both master and slave mode is available.
Trigger function	Condition	Error, specified ID and data (max 8 characters, don't care and bit mask are available), specific remote frame, timer or counter, external signal or status of external trigger input.
	Action	Measurement stop, saving data in a memory card, timer control, counter control,CAN data transmission, buzzer, valid/invalid of trigger conditions.
External input		Record 4 channels of digital/analog value with the data at specified cycle or when it receives communication data. (measurement range: ±18V)
Retrieval function		Retrieve communication data (max 8 characters), CAN remote frame, various errors, specified range of time stamp, trigger match data, status of external signal.

9.2   Measurement port signal definition

■   CAN/CAN FD Port

1Pin   5Pin

6Pin   9Pin
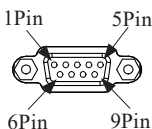
Dsub9pin（female）				
Pin	Signal	Input/Output[*1]		Description
		Monitor	Simulation	
1	-	-	-	No use
2	CAN-	I	I/O	CAN/CAN FD bus powe
3	GND	-	-	Signal ground
4	-	-	-	No use
5	FG	-	-	Frame ground
6	-	-	-	No use
7	CAN+	I	I/O	CAN/CAN FD bus powe
8	-	-	-	No use
9	PWR	I	I	CAN/CAN FD bus powe[※2]

  * 1："I" indicates input to analyzer. "O" indicates output from analyzer.
  * 2：LED of "BAT1" lights when it uses the bus power.

■   CXPI Port

1pin →
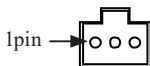
Pin No	Probe cable	Signal	Description
1	Red lead wire	Vbat	9-18V
2	Blue lead wire	CXPI_Bus	CXPI bus signal
3	Black lead wire	SG	Signal ground

■ External input/output Port

⑦	⑤	③	①
⑧	⑥	④	②

Pin No	Signal	Description	Probe cable
1	IN4	Digital/analog input 4	Orange (Alligator clip)
2	GND	Signal ground	Black (Alligator clip)
3	IN2	Digital/analog input 2	Orange (Alligator clip)
4	IN3	Digital/analog input 3	Orange (Alligator clip)
5	TRG OUT	Trigger output	Red (Test clip)
6	IN1	Digital/analog input 1	Orange (Alligator clip)
7	TRG IN	Trigger input	Brown (Test clip)
8	GND	Signal ground	Black (Alligator clip)

＊1：Measurement range for analog input 1 to 4 is +-18V.
＊2：Voltage range of trigger input is -0.5V to 6.0V.

9.3 About J1939

PGN and SPN of J1939-71 (Rev.2003-12) which LINEEYE analyzer translates
are below.

PGN	Display
61442	Electronic Transmission Controller 1
61443	Electronic Engine Controller 2
61444	Electronic Engine Controller 1
61445	Electronic Transmission Controller 2
61448	Hydraulic Pressure Governor Info
65110	TANK Information 1
65164	Auxiliary Analog Information
65178	Turbocharger Information 2
65187	Exhaust Port Temperature 1
65188	Engine Temperature 2
65198	Air Supply Pressure
65201	ECU History
65203	Fuel Information (Liquid)
65213	Fan Drive
65243	Engine Fluid Level/Pressure 2
65245	Turbocharger
65246	Air Start Pressure

PGN	Display
65247	Electronic Engine Controller 3
65248	Vehicle Distance
65253	Engine Hours, Revolutions
65255	Vehicle HoursVH
65257	Fuel Consumption (Liquid)
65262	Engine Temperature 1
65263	Engine Fluid Level/Pressure 1
65265	Cruise Control/Vehicle Speed
65266	Fuel Economy (Liquid)
65269	Ambient Conditions
65270	Inlet/Exhaust Conditions 1
65271	Vehicle Electrical Power
65272	Transmission Fluids
65276	Dash Display

SPN	Display	Unit	PGN
46	Pneumatic Supply Pressure	kPa	65198
51	Throttle Position	%	65266
52	Engine Intercooler Temperature	C	65262
82	Air Start Pressure	Pa	65246
84	Wheel-Based Vehicle Speed	km/h	65265
91	Accelerator Pedal Position 1	%	61443
92	Percent Load At Current Speed	%	61443
94	Fuel Delivery Pressure	Pa	65263
96	Fuel Level	%	65276
98	Engine Oil Level	%	65263
100	Engine Oil Pressure	kPa	65263
102	Boost Pressure	kPa	65270
103	Turbocharger 1 Speed	rpm	65245
105	Intake Manifold 1 Temperature	deg C	65270
106	Air Inlet Pressure	kPa	65270
107	Air Filter 1 Differential Pressure	kPa	65270
108	Barometric Pressure	kPa	65269
109	Coolant Pressure	kPa	65263
110	Engine Coolant Temperature	deg C	65262
111	Coolant Level	%	65263
114	Net Battery Current	A	65271
115	Alternator Current	A	65271
123	Clutch Pressure	kPa	65272
127	Transmission Oil Pressure	kPa	65272
157	Injector Metering Rail 1 Pressure	Mpa	65243

SPN	Display	Unit	PGN
161	Input Shaft Speed	rpm	61442
164	Injection Control Pressure	Mpa	65243
167	Alternator Potential (Voltage)	V	65271
168	Electrical Potential (Voltage)	V	65271
172	Air Inlet Temperature	deg C	65269
173	Exhaust Gas Temperature	deg C	65270
174	Fuel Temperature	deg C	65262
175	Engine Oil Temperature 1	deg C	65262
176	Turbo Oil Temperature	deg C	65262
177	Transmission Oil Temperature	deg C	65262
182	Trip Fuel	L	65257
183	Fuel Rate	L/h	65266
184	Instantaneous Fuel Economy	km/kg	65266
185	Average Fuel Economy	km/kg	65266
190	Engine Speed	rpm	61444
191	Output Shaft Speed	rpm	61442
244	Trip Distance	km	65248
245	Total Vehicle Distance	km	65248
246	Total Vehicle Hours	hr	65255
247	Total Engine Hours	hr	65255
250	Total Fuel Used	L	65257
441	Auxiliary Temperature 1	deg C	65164
512	Driver's Demand Engine - Percent Torque	%	61444
513	Actual Engine - Percent Torque	%	61444
515	Engine's Desired Operating Speed	rpm	65247
523	Current Gear		61445
524	Selected Gear		61445
975	Estimated Percent Fan Speed	%	65213
1029	Trip Average Fuel Rate	L/h	65203
1032	Total ECU Distance	km	65201
1136	Engine ECU Temperature	C	65188
1137	Exhaust Gas Port 1 Temperature	C	65187
1138	Exhaust Gas Port 2 Temperature	C	65187
1172	Turbocharger 1 Compressor Inlet Temperature	C	65178
1349	Injector Metering Rail 2 Pressure	Mpa	65243
1387	Auxiliary Pressure #1	kPa	65164
1761	Catalyst Tank Level	%	65110
1762	Hydraulic Pressure	kPa	61448

Chapter 10 After Support and Maintenance

10.1 How to make it back to default state

By the software reset, you can clear the internal setting of line monitor and make it back to the default state of shipment.

■ Software reset control
While the power is off, turn on the power pressing [ENTER]+[TOP/DEL].
"Initialized!!" message is displayed on the opening screen.

　📄 When there is any problem in the behavior of line monitor, this operation may solve it.

　📄 Please note that by this operation measured data in the buffer memory is also all cleaned.

10.2 Warranty and After service

📖 Warranty

■ When you face any problems, please contact LINEEYE distributors or LINEEYE

■ Warranty
Within a period of 12 months from the date of shipment, LINEEYE warrants that your purchased products (except consumable parts such as the battery and software) are free of charge from any defects in material and workmanship, only when the products are operated in accordance with procedures described in the documents supplied by LINEEYE. If the defects exist during the Warranty period, please send back the products to LINEEYE distributors or LINEEYE. LINEEYE will repair or exchange them at no charge. In this case , the shipping charge will be at your own expense.The foregoing warranties are the sole warranties given by LINEEYE. Above warranties shall not be applied to the products that have been modified, repaired or altered (except by LINEEYE) or that have been subjected to unusual physical or electrical stress, misuses, abuse, negligence or accidents. LINEEYE disclaims all other warranties including the warranties of merchantability fitness for some particular purpose and noninfringement of third party right. LINEEYE cannot promise that the software is error-free or will operate without any interruption.

📖 User Registration

For after service and other information, please register in our Website.

📖 Repair

For malfunction, please contact LINEEYE distributors or LINEEYE and tell us following details.

Model	OP-SB7XC
Serial Number	8 digit numbers
Purchase Date	Year, Month, Day
Other	Details of malfunction

■ Repair during warranty period
  LINEEYE repairs, following the repair instruction.
  Please provide the details of malfunction.

■ Repair after warranty period
  LINEEYE will repair the products at our own expense.

■ Calibration
  Enable to have a hardware calibration test by the line monitor.

📖 After Support

Read "FAQ" in our Website or email us.
Please refer to "FAQ". We also have support by email regarding the technical issue. When you use it, please register your product via our website.

Website : https://www.lineeye.com

There is a registration page on our web site.
(https://www.lineeye.com)
Please register your product for further support.
We will provide you the firmware update
 information and sales information etc.

LINEEYE CO., LTD.