

OPTIONAL KIT  
FOR MULTI PROTOCOL ANALYZER  
LE-8200A/LE-8200

LAN Communications Expansion Kit

**OP-SB89**

Instruction Manual



# Instruction

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Thank you for your purchase of OP-SB89.

To use it correctly, you are advised to read and understand this instruction manual thoroughly. Keep this together with the warranty card. If you encounter any problems, you will find helpful information in this manual.

## NOTICE

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It is prohibited to reprint or duplicate any part or 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 send 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

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This product is not intended to be incorporated into systems that require extremely high reliability and safety, such as aerospace equipment, trunk communication equipment, nuclear power control equipment, and medical equipment related to life support. Therefore, do not use for those purposes.

# Safety Information

## Read this first !!

Here, for users of the products, the important notice to prevent hazard to the human and to prevent damage to the property. And it describes safe and right way to use the products. Before using, please read the main contents after you understand the following Warning and Caution.

 **Warning** There is a possibility of accidents, such as a death or a serious injury, may occur.

 **Caution** There is a possibility of accidents, such as a injury , and property damage may occur.

 <b>Warning</b>	
	<ul style="list-style-type: none"><li>● Stop using the analyzer immediately when smoke or smells emanate from itself. Continuous use may result in an electric shock, a burn and/ or fire.</li></ul>
	<ul style="list-style-type: none"><li>● Stop using the analyzer when a liquid or foreign substance get into the analyzer. This may result in an electric shock or fire. → Immediately switch off the analyzer and unplug it.</li></ul>
	<ul style="list-style-type: none"><li>● Do not disassemble, modify or repair analyzer. This may result in a injury, an electric shock, fire, explosion and/or a breakdown due to overheating.</li></ul>
	<ul style="list-style-type: none"><li>● Do not put the analyzer in fire or heat them. This may result in a injury and fire due to overheating or explosion.</li></ul>

## ⚠ Warning

	<ul style="list-style-type: none"><li>●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 affected by direct sun or near the fire or where the hot air is. Place with leaking water or electricity.</li></ul>
	<ul style="list-style-type: none"><li>●Do not connect the LAN cables to the OP-SB89 before connecting it to the analyzer. The LAN cable supporting PoE will transmit the high voltage, it will cause the electric shock and the product malfunction.</li></ul>
	<ul style="list-style-type: none"><li>●Do not touch the parts of this interface board. There are high voltage area when the cable supplying the PoE power connected to this board. It will cause the electric shock, fire and the product malfunction.</li></ul>

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# Chapter 1 Before Using the Product

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## 1.1 Unpacking

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

- The product has not been damaged during transportation.
- You have received all standard accessories listed below.

<input checked="" type="checkbox"/>	Interface Board	1
<input checked="" type="checkbox"/>	CD-ROM (firmware etc.)	1
<input checked="" type="checkbox"/>	Line State Sheet	1
<input checked="" type="checkbox"/>	LAN cable (straight,3m)	1
<input checked="" type="checkbox"/>	Instruction Manual (This book)	1
<input checked="" type="checkbox"/>	Warranty Cards	1

-  Please contact your LINEEYE distributors if you find any damage to the product caused by transportation, or if there are accessories lacking.

## 1.2 Overview

---

OP-SB89 is the interface expansion board for the multi protocol analyzer LE-8200 series. This is not only for measuring the Ethernet LAN (IEEE802.3) but also PoE (Power over Ethernet, IEEE802.3af).

It has many functions such as On-Line Monitor, PoE Measurement, Statistic function, Cable Test, PING functions and so on.

# Chapter 2 Basic Operation

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## 2.1 Preparation Before Measuring

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Before starting measurement, install the OP-SB89 firmware and change the interface expansion board and line state sheet.

### 2.1.1 Installation of Firmware

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Install the OP-SB89 firmware, which is recorded in the CD-ROM. Follow the instructions below.

#### 1) Connection to the analyzer

Connect the AUX(RS-232C) of analyzer and the serial port of the PC using a AUX cable. Connect the AUX port of analyzer and the COM port of PC.

Or, connect USB ports of analyzer and PC.

<Attention>

When the analyzer is connected to the PC through the USB cable, the Windows requires the USB driver. The USB driver is stored in the CD-ROM.

 For detailed installation procedure, see the LE-8200/LE-8200A instruction manual.

#### 2) Configuration of analyzer

Use the AC adapter to run the analyzer.

For COM port connection, set AUX conditions as below.

Speed:	115200/230400
Data bit:	8
Parity:	None
X-control:	Off

(Speed should be the same setting in respect of that of the transferring software "le8firm".)

#### 3) Invoking of the firmware loader

Turn off the power of analyzer. Turn on the power again while pressing [Shift]+[File]. The firmware loader will be executed.

#### 4)Executing the transferring software "le8firm"

Open the file of "le8firm.exe".

#### 5)Transfer the firmware

- i) Select "USB/Serial Port" from "Method".
- ii) Click [Next]
- iii) Click [Select] and select the firmware "OPSB89.FW2",
- iv) Click [Start]. "Complete" will appear on the window.
- v) Click [Close].

#### 6)Reboot the analyzer

"Firmware write succeeded."will appear when completing the firmware transfer. Reboot the analyzer to use the OP-SB89 firmware.

Turn off the analyzer. After changing to the expansion board(OP-SB89), it will work as OP-SB89 firmware.

**<Attention>**

Do not turn off the power of the analyzer while installing the firmware. That will cause the problems (cannot turn on the power) and need to send back the product to LINEEYE.

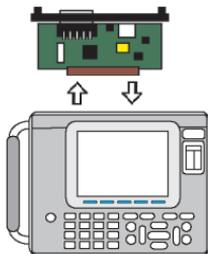
#### ■ Firmware for the standard board/other interface boards.

Once OP-SB89 firmware is installed, you can simply change the expansion board(OP-SB89) to the standard board(or other interface boards) while the analyzer's power off and turn on its power. Then proper firmware will automatically start.

## 2.1.2 Inserting the Interface Board

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To exchange an interface board inserted in the analyzer to OP-SB89, follow the instructions.

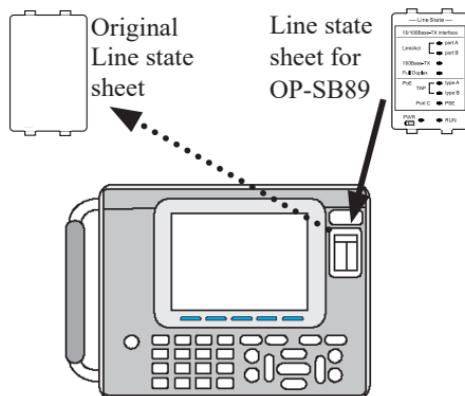


- 1) Turn off the analyzer.
- 2) Screw off M3 screws on the expansion slot of analyzer.
- 3) Remove the board pulling the handles of board.
- 4) Insert the interface expansion board (OP-SB89) into the slot completely.
- 5) Screw it on using M3 screws.

## 2.1.3 Line State Sheet

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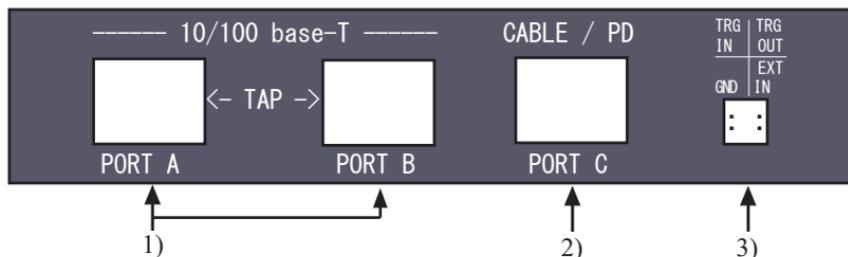
Change the line state sheet to the one comes with the OP-SB89.



- 1) Remove the original line state sheet.
- 2) Replace the line state sheet for OP-SB89.

 **Take care not to lose the detached sheet.**

## 2.2 Ports of the Interface Expansion Board



1)PORT A, B For on-line monitor, PoE measurement, Statistic analysis (Fail-safe TAP for PoE devices), PING function, and Port blinking function (LAN ports of 10BASE-T/100BASE-TX).

2)PORT C For cable test and PSE detection, it will work as Dummy PD (counterpart of PoE device).

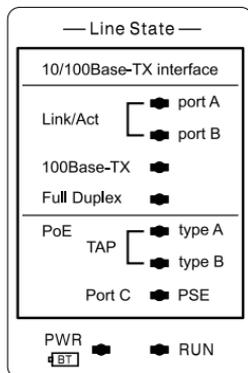
3)External Input Terminal It automatically stops the on-line monitoring when the external signal connected to the TRG IN terminal becomes "L (TTL)" level.

- ☞ Use the cables, which comes with the analyzer(TRG IN and TRG OUT are not in use).
- ☞ External signal trigger is available to be set when "Trigger" is "On" from the "Top menu" -> [2]"Trigger".

## 2.3 Line State LED

Line State LEDs on the analyzer have the different meaning when changing to the different expansion board.

Change the line state sheet, which comes with the OP-SB89, and understand the meaning of each LED.



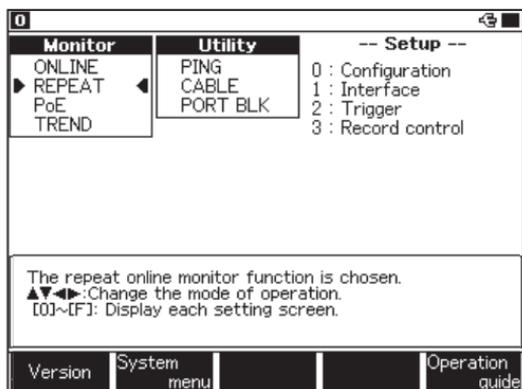
LED		Monitor	PING
Link/Act Port A	ON	-	Link-up
	OFF	No data	Link-down
	Blinking	Receiving RX data	Transmit/Receive data
Link/Act Port B	ON	-	Link-up
	OFF	No data	Link-down
	Blinking	Receiving TX data	Transmit/Receive data
100Base-TX	ON	100 Base-TX connection	
	OFF	10Base-T connection	
	Blinking	Mismatched speed <sup>(*)</sup>	-
Full Duplex	ON	-	Full Duplex connection
	OFF		Half Duplex connection
	Blinking		Collision
PoE TAP type A	ON	PoE Alternative A detected	-
	OFF	PoE Alternative A not detected	
PoE TAP type B	ON	PoE Alternative B detected	
	OFF	PoE Alternative B not detected	
PoE Port C	ON	PSE(Power Source Equipment) detected	
	OFF	-	-

\*1: Indicates that speed of the TX(transmission) is different from the that of RX(reception).

## 2.4 Functions

---

Press [Menu] and select the function by [ ▲ ] [ ▼ ] [▲][▼] keys.



ONLINE : On-line Monitor function

REPEAT : REPEAT ONLINE

Monitor function

PoE : PoE Measurement

function

TREND : Statistic function

PING : PING function

CABLE : Cable Test function

PORT BLK : Port Blinking function

## 2.5 Battery Drive Runtime

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The OP-SB89 (inserted in the analyzer) can work by the battery drive for about 2 hours. When running the important test, use the AC adapter and save the data into the CF card (option) or USB flash drive for back up.

 Use the Auto-save function if necessary. Refer to the manual of analyzer for more details.

# Chapter 3 Online Monitor Function

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ONLINE monitor function is for recording the LAN frames of networks with the time stamp information into the Buffer memory. Beside the ONLINE mode, there is the REPEAT mode which can display data at real time and save data into the CF card automatically.

[Difference between ONLINE and REPEAT]

Monitor Mode	ONLINE	REPEAT
Measuring	Stop measuring after saving data in the 100M byte Buffer memory.	Use the two-divided Buffer memory alternately.
Real time display	No	Yes *1
Auto save	No	Yes *2
Use for	Record all frames for high volume of data.	Record continuously for small volume of data.

\*1: It only displays "Frame display" and cannot pause displaying data.

\*2: 50M bytes for one file.

## 3.4 Data Recording Configuration

<REPEAT mode>

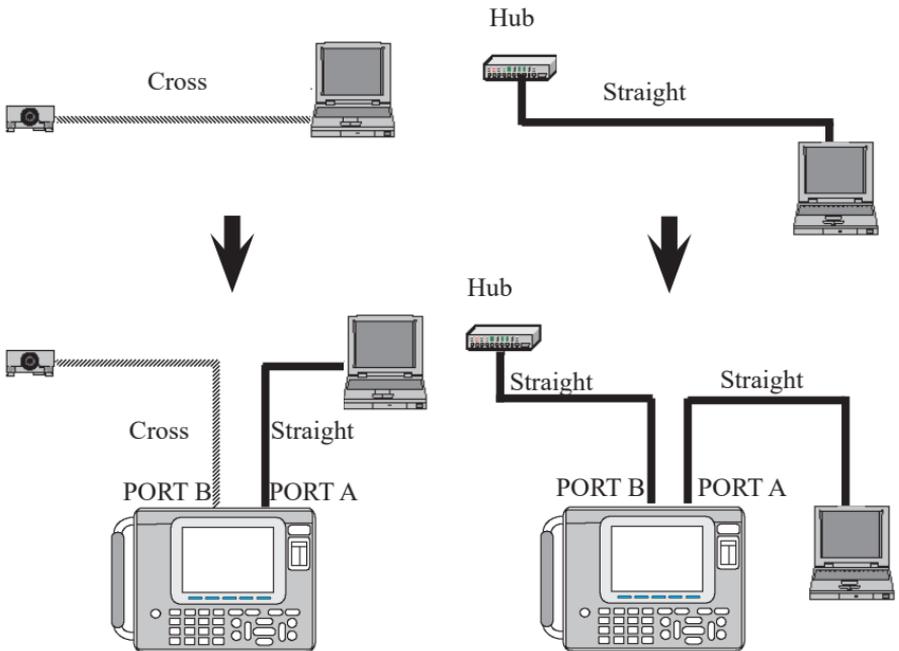
Buffer memory is divided into BUF1 and BUF2 (50M byte for each). Log data is saved in the BUF1 and when BUF1 becomes full, it starts saving in the BUF2. When BUF2 becomes full, it goes back to the BUF1 and deletes the oldest data in the BUF1.

### 3.1 Connection

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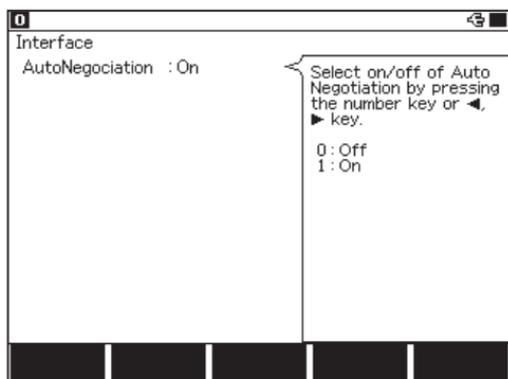
Connect the LAN cables to the PortA and PortB as followings.

Use the LAN cables which come with the analyzer or straight cables of category 5 (or above).



## 3.2 Interface Setup

From the top menu, press [1]”Interface”. Select the appropriate interface.



### ■ AutoNegotiation

Select On/Off of Auto Negotiation.

When "On" is selected, speed and communication types are automatically selected.

When "Off" is selected, select the speed and communication types.

### ■ Speed

Select "10BASE" or "100BASE".

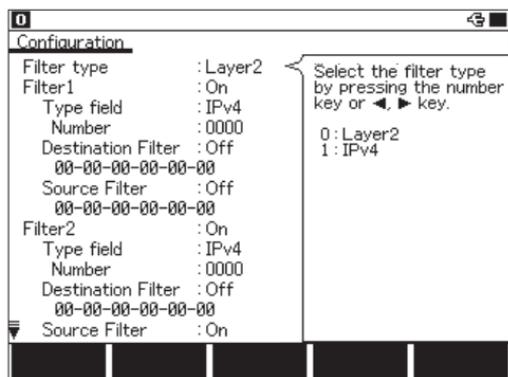
### ■ Duplex

Select "Half (duplex)" or "Full (duplex)".

☞ If selected configurations are not correct, analyzer cannot measure data correctly.

## 3.3 Filter Setup

Set the filter conditions from top menu -> [0]“Configuration”.



### ■ Filter Type

Select the filter type.

Layer2: Layer 2 field.

IPv4 : IP(Version4) field.

### ■ Filter1/2

Set the settings of Filter1 and Filter2.

☞ When Filter1 is "Off", Filter2 will be automatically "Off".

## <Layer2>

Set the conditions of MAC header for target frame.

### ■ Type field

Select the type field from IPv4, ARP, NetBios, IPv6, Custom (specify the number) and All.

### ■ Number

Input the type number, in the case of the selecting "Custom" at "Type field ".

### ■ Destination Filter

On: Input the MAC address of destination.

Off: Do not specify.

### ■ Source Filter

On: Input the MAC address of Source.

Off: Do not specify.

## <IPv4>

Set the conditions of IP header for IPv4 frame.

### ■ Protocol field

Select the protocol field from ICMP, IGMP, TCP, UDP, Custom (specify the number) and All.

### ■ Number

Input the protocol number, in the case of the selecting "Custom" at "Protocol field ".

### ■ Destination Filter

On: Input the IP address of destination in the "Network Address" and "Subnet Address".

Off: Do not specify.

### ■ Source Filter

On: Input the IP address of source in the "Network address" and "Subnet Address".

Off: Do not specify.

■ Network Address

Input the IP address (host address) of destination/source.

■ Subnet Mask

On: Input the Subnet mask of destination/source.

Inputted Network Address and Subnet Mask will be calculated. Then, the result will be the target network address.

Off: Do not specify

**【Example of IPv4 setting】**

Device A

IP 192.168.1.5



Device B

IP 192.168.1.6



Device C

IP 192.168.1.7



Device X

IP 192.168.2.10



Device Y

IP 192.168.2.9

PORT B

PORT A



Device D

IP 192.168.1.8

- Example of monitoring TCP/IP protocol between Device A and Device D.

- Example of monitoring UDP protocol between Devices (A/B/C/D). And their network address is "192.168.1".

<u>Configuration</u>	
Filter type	:IPv4
Filter 1	:On
Protocol field	:TCP
Destination Filter	:On
Network Address	
192.168.1.5	
Subnet Mask	:Off
Source Filter	:On
Network Address	
192.168.1.8	
Subnet Mask	:Off
Filter 2	:On
Protocol field	:TCP
Destination Filter	:On
Network Address	
192.168.1.8	
Subnet Mask	:Off
Source Filter	:On
Network Address	
192.168.1.5	
Subnet Mask	:Off

The above conditions are set to monitor TCP frames. In the Filter 1, it is set to monitor from Device D to Device A. In the Filter 2, it is set to monitor from Device A to Device D.

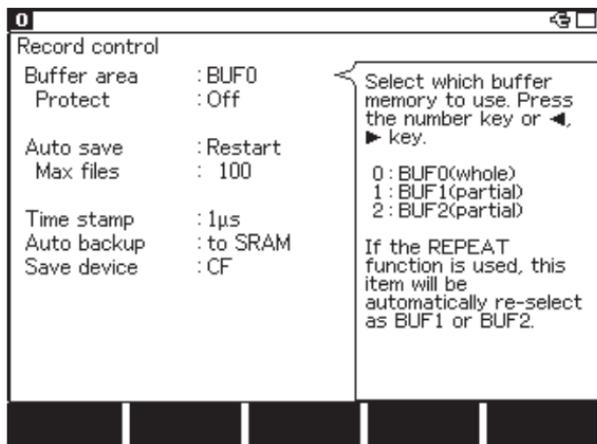
<u>Configuration</u>	
Filter type	:IPv4
Filter 1	:On
Protocol field	:UDP
Destination Filter	:On
Network Address	
192.168.1.0	
Subnet Mask	:On
255.255.255.0	
Source Filter	:On
Network Address	
192.168.1.0	
Subnet Mask	:On
255.255.255.0	
Filter 2	:Off

In the Filter 1, it is set to monitor the frame (UDP protocol), which network address of destination IP/source IP is "192.168.1".

## 3.4 Data Recording Configuration

From top menu, press[3]:“Record control”.

- Following describes the differences from the standard board. Please refer to Analyzer instruction manual as well.



### ■ Buffer area

For REPEAT mode, BUF1 and BUF2 will be used alternately no matter how the setting is.

### ■ Auto save

Auto save function is valid only for REPEAT mode. Firstly, the analyzer starts saving captured data in BUF1. When BUF1 becomes full, the analyzer starts saving captured data in the other buffer(BUF2) and transfers the data in BUF1 to the Storage device (CF card or USB flash drive). This is same when BUF2 becomes full. In this way, captured data will be transferred to the Storage device continuously. If the transfer process from BUF1 or 2 to the Storage device is not finished until another BUF is filled, the analyzer will wait its being finished and stop changing BUF1 or 2 until that. Meanwhile new data will be lost.

- It is impossible to record the occurrence of "data loss".
- It cannot specify the size of log file (50M bytes fixed).

## ■Auto backup

Auto backup function is valid only for REPEAT mode. At the time point of stop measurement, the BUF1 or 2 which is in progress of saving captured data will be backed up automatically.

## ■Save device (LE-8200A only)

Select "CF" card or "USB" flash drive to save Auto Save file or Auto back-up file.

## 3.5 Start and Stop Measurement

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### Starting measurement

When pressing [Run], "Now Measuring" is displayed. And, it captures data in the buffer. The state of receiving packets can be confirmed through the blinking of LED(Link/Act).

1 69956 Overview			
Time (m:s.μs)	Source	Destination	Protocol
35:08.539700	192.168.0.7	66.249.89.99	TCP
35:08.555100	66.249.89.99	192.168.0.7	TCP
35:08.577500	72.14.203.100	192.168.0.7	TCP
35:08.577500	192.168.0.7	72.14.203.100	TCP
35:08.587800	66.249.89.99	192.168.0.7	TCP
35:08.624200	72.14.203.100	192.168.0.7	TCP
35:08.624900	72.14.203.100	192.168.0.7	TCP
35:08.644700	192.168.0.7	72.14.203.100	TCP
35:08.644700	192.168.0.7	66.249.89.99	TCP
35:08.783700		FF-FF-FF-FF-FF-FF	IPX
35:08.944800	192.168.0.2	192.168.0.255	UDP
35:08.944900	192.168.0.2	192.168.0.255	UDP
35:08.954000	192.168.0.7	192.168.0.1	UDP
35:08.959000	192.168.0.1	192.168.0.7	UDP

Change time display

- ☰ The captured data will not be displayed during the "RUN" on ONLINE mode.

## Stopping measurement

Press [Stop] to finish the measurement. And it also stops when the trigger condition is formed. On ONLINE mode, it automatically stops when the buffer becomes full.

When stopping the measurement, it displays the latest data in the screen.

## 3.6 Display

Press [Data] key. “Frame display” can be changed to “Detailed display”.

### ■Frame display

It displays the LAN frames with the time stamp information on the screen.

#### 1)Time stamp

2)Source address

3)Destination address

4)Protocol

Time (m:s.μs)	Source	Destination	Protocol
35:08.539700	192.168.0.7	66.249.89.99	TCP
35:08.555100	66.249.89.99	192.168.0.7	TCP
35:08.577500	72.14.203.100	192.168.0.7	TCP
35:08.577500	192.168.0.7	72.14.203.100	TCP
35:08.587800	66.249.89.99	192.168.0.7	TCP
35:08.624200	72.14.203.100	192.168.0.7	TCP
35:08.624900	72.14.203.100	192.168.0.7	TCP
35:08.644700	192.168.0.7	72.14.203.100	TCP
35:08.644700	192.168.0.7	66.249.89.99	TCP
35:08.783700	FF-FF-FF-FF-FF-FF	FF-FF-FF-FF-FF-FF	IPX
35:08.944800	192.168.0.2	192.168.0.255	UDP
35:08.944900	192.168.0.2	192.168.0.255	UDP
35:08.954000	192.168.0.7	192.168.0.1	UDP
35:08.959000	192.168.0.1	192.168.0.7	UDP

[F1]:change the time unit

“Time(m:s: μ s)” ←

minute: second:μs

↓

“Time(h:m:s.ms)”

hour: minute: second.ms

↓

“Time(y-m-d)”

date of the measurement

↓

“Δ Time(s)”

elapsed time from the last frame

Press [ ▲ ] [ ▼ ] [PageUp] [PageDown] keys for scrolling.

## ■Detailed display

Display the details of the frame, which is displayed on the top of the Frame Display.

[F3] key : The translation view can be changed to the HEX dump view.

### ●Translation view

Time (m:s.µs)	Source	Destination	Protocol
35:08.539700	192.168.0.7	66.249.89.99	TCP

Type: IP (0x0800)  
Internet Protocol  
Version: 4  
Header length: 20  
Service type: 0x00  
Total length: 257  
Identification: 0x146e (5230)  
Flags: 0x00  
Fragment offset: 2048  
Time to live: 128  
Protocol: TCP (0x06)  
Header checksum: 0x887d - correct  
Source: 192.168.0.7  
Destination: 66.249.89.99  
Transmission Control Protocol

← The target frame for translation display

[PageUp][PageDown] key :  
Scroll the target frame.

Contents of the protocol on the translation view

[▲][▼] key :  
Scroll the contents on the translation view.

Refer to the specifications of each protocol to understand the contents of the protocol.

### ●HEX dump view

Time (m:s.µs)	Source	Destination	Protocol
35:08.539700	192.168.0.7	66.249.89.99	TCP

030: FC 16 38 AE 00 00 35 30 63 38 36 35 62 66 34 62  
040: 3A 55 3D 35 30 63 61 64 62 64 37 62 63 65 30 30  
050: 33 39 33 3A 54 4D 3D 31 32 37 38 32 39 37 33 39  
060: 38 3A 4C 4D 3D 31 32 37 38 33 30 31 36 37 39 3A  
070: 53 3D 70 73 66 4E 54 67 5F 66 6D 35 6D 44 56 48  
080: 78 42 3B 20 4E 49 44 3D 33 37 3D 51 2D 7A 72 31  
090: 4A 71 66 5F 4B 63 47 57 37 62 39 44 49 37 4D 6D  
0A0: 64 78 46 37 43 41 52 51 44 59 61 59 36 36 4F 4D  
0B0: 73 68 4D 30 6F 30 62 39 59 75 37 68 35 54 72 4B  
0C0: 53 46 55 4C 55 32 69 50 52 2D 4A 42 57 33 56 6B  
0D0: 5A 73 6B 4F 74 6A 59 4E 73 59 5F 66 6B 47 39 6E  
0E0: 59 62 51 32 71 35 68 62 43 70 43 41 2D 74 6C 4A  
0F0: 38 34 41 32 70 41 53 57 67 4F 38 6F 2D 76 46 52  
100: 33 70 38 69 6E 77 56 31 48 65 43 0D 0A 0D 0A

← The target frame for dump view.

[PageUp][PageDown] key :  
Scroll the target frame.

Contents of the Ethernet frames on the HEX dump view.

[▲][▼] key :  
Scroll the contents on the dump view.

## ■ Printing Out Data

Recorded data can be printed as it is displayed (formatted) on the screen.

**Operation : Press[Print]and then input the number of page ([0]-[9]). Press [Enter]**

 Refer to the manual of analyzer "Printing function" for more details.

### • Example of Frame display

```
==[LE-8200]====[2013-02-21 11:20:10]==
* Model      : LE-8200          *
* Version    : 1.02           *
* Extension  : OP-SB89        *
* Serial No. : XXXXXXXX      *
* Start time : 2013-02-21 11:18:24 *
* Stop time  : 2013-02-21 11:19:32 *
-----*-----
* PROTOCOL: LAN              *
-----*-----
```

Date	Time	Source	Destination	Protocol
2013-02-21	11:18:34	779400	192.168.0.200	192.168.0.255 UDP
2013-02-21	11:18:35	789400	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:18:35	790600	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	790700	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:18:35	801500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	801700	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:18:35	812600	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	813000	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:18:35	824500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	825000	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:18:35	835600	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	886500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	937600	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:35	988500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:36	039500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:36	090500	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:18:39	287100	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:39	375000	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:39	501100	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:39	739000	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:46	329200	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:46	475300	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:46	656200	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:46	659100	192.168.0.254	239.255.255.250 UDP
2013-02-21	11:18:51	258500	192.168.0.11	192.168.0.255 UDP
2013-02-21	11:18:52	043700	192.168.0.19	255.255.255.255 UDP
2013-02-21	11:18:52	044700	192.168.0.19	192.168.0.255 UDP
2013-02-21	11:18:52	234700	192.168.0.13	192.168.0.255 UDP
2013-02-21	11:18:52	234800	192.168.0.13	192.168.0.255 UDP
2013-02-21	11:18:52	234800	192.168.0.13	192.168.0.255 UDP
2013-02-21	11:18:52	234900	192.168.0.13	192.168.0.255 UDP
2013-02-21	11:18:52	244600	192.168.0.252	255.255.255.255 UDP
2013-02-21	11:18:52	254300	192.168.0.252	255.255.255.255 UDP
2013-02-21	11:19:21	091100	192.168.0.60	192.168.0.9 TCP
2013-02-21	11:19:21	091200	192.168.0.9	192.168.0.60 TCP
2013-02-21	11:19:22	048400	192.168.0.19	255.255.255.255 UDP
2013-02-21	11:19:22	049000	192.168.0.19	192.168.0.255 UDP

### • Example of Detailed display (translation display)

```
==[LE-8200]====[2013-02-21 11:22:26]==
* Model      : LE-8200          *
* Version    : 1.02           *
* Extension  : OP-SB89        *
* Serial No. : XXXXXXXX      *
* Start time : 2013-02-21 11:18:24 *
* Stop time  : 2013-02-21 11:19:32 *
-----*-----
* PROTOCOL: LAN              *
-----*-----
```

Date	Time	Source	Destination	Protocol
2013-02-21	11:18:35	801700	192.168.0.9	192.168.0.60 TCP

Ethernet II  
Destination: 00-XX-XX-XX-XX-XX  
Source: 00-XX-XX-XX-XX-XX  
Type: IP (0x0800)

Internet Protocol  
Version: 4  
Header length: 20  
Service type: 0x00  
Total length: 118  
Identification: 0xe67e (59006)  
Flags: 0x02  
Fragment offset: 0  
Time to live: 128  
Protocol: TCP (0x06)  
Header checksum: 0x926d - correct  
Source: 192.168.0.9  
Destination: 192.168.0.60

Transmission Control Protocol  
Source port: 1379  
Destination port: 10001  
Sequence number: 3636082329  
Acknowledgment number: 2557373185  
Data offset: 20  
Flags: -AP--- (0x18)  
Window: 65529  
Checksum: 0x8223 - correct

Data  
Length: 78  
000: 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13  
010: 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22 23  
020: 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F 30 31 32 33  
030: 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F 40 41 42 43  
040: 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F 50 51

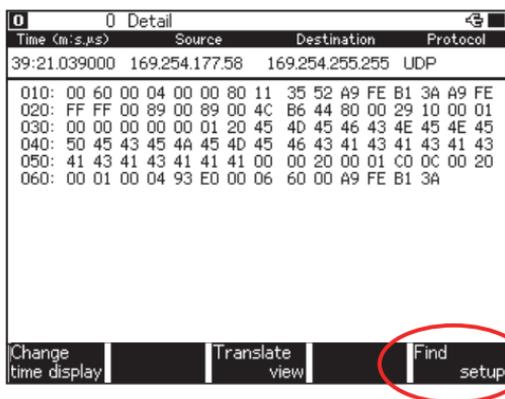
Date	Time	Source	Destination	Protocol
2013-02-21	11:18:35	812600	192.168.0.60	192.168.0.9 TCP

Ethernet II

## 3.7 Retrieval Function

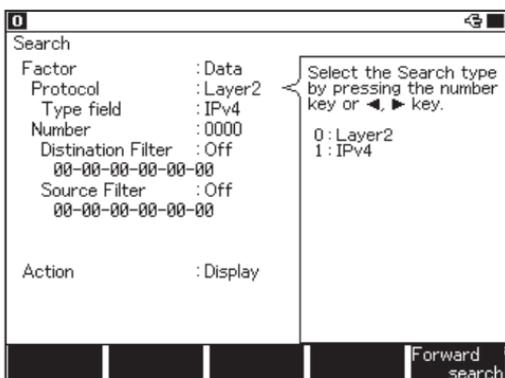
The retrieval function enables you to find the specific data.

Press [F5] "Find setup" for setting the retrieval conditions. Press [F5] for forward search, or press [Shift] + [F5] for backward search. (While displaying on the Data display, press [E] for forward search or [F] for backward search.)



Time (m:s,µs)	Source	Destination	Protocol
39:21.039000	169.254.177.58	169.254.255.255	UDP
010:	00 60 00 04 00 00 80 11	35 52 A9 FE B1 3A A9 FE	
020:	FF FF 00 89 00 89 00 4C	B6 44 80 00 29 10 00 01	
030:	00 00 00 00 00 01 20 45	4D 45 46 43 4E 45 4E 45	
040:	50 45 43 45 4A 45 4D 45	46 43 41 43 41 43 41 43	
050:	41 43 41 43 41 41 41 00	00 20 00 01 C0 0C 00 20	
060:	00 01 00 04 93 E0 00 06	60 00 A9 FE B1 3A	

Press [F5] "Find setup" for setting the retrieval conditions.



Search

Factor : Data

Protocol : Layer2

Type field : IPv4

Number : 0000

Destination Filter : Off  
00-00-00-00-00-00

Source Filter : Off  
00-00-00-00-00-00

Action : Display

Select the Search type by pressing the number key or ◀ ▶ key.

0 : Layer2

1 : IPv4

Forward search

### ■ Protocol

Select the protocol type to retrieve.

Layer2 : Layer 2 field.

IPv4 : IP(Version4) field.

## <Layer2>

Set the conditions of MAC header for target frame.

### ■ Type field

Select the type field from IPv4, ARP, NetBios, IPv6, Custom (specify the number) and ALL.

 Any value can be set to the type field at "Custom".

 All type fields are the retrieval object at "ALL".

### ■ Number

Input the type number, in the case of the selecting "Custom" at "Type field".

### ■ Destination Addr

On: Input the MAC address of destination.

Off: Do not specify.

### ■ Source Addr

On: Input the MAC address of source.

Off: Do not specify.

## <IPv4>

Set the conditions of IP header of Ipv4 frame.

### ■ Protocol field

Select the protocol field from ICMP, IGMP, TCP, UDP, Custom (specify the number) and All.

 Any value can be set to the protocol field at "Custom".

 All protocol fields are the retrieval object at "ALL".

### ■ Number

Input the protocol number, in the case of the selecting "Custom" at "Protocol field".

### ■ Destination Port

Select the destination port number from ftpdata, ftpctrl, telnet, smtp, http, pop3, Custom (specify the number) and All, in the case of selecting "TCP" or "UDP" at "Protocol field".

### ■ Source Port

Select the source port number from ftpdata, ftpctrl, telnet, smtp, http, pop3, Custom (specify the number) and All, in the case of selecting "TCP" or "UDP" at "Protocol field".

### ■ Number

Input the port number, in the case of selecting "Custom" at "Destination Port" or "Source Port".

### ■ Destination Addr

On: Input the IP address of destination.

Off: Do not specify.

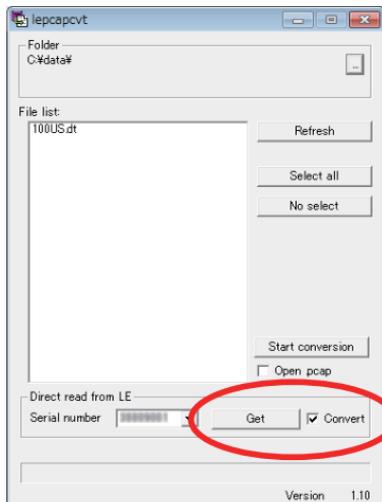
- Source Addr
  - On: Input the IP address of source.
  - Off: Do not specify.
- Subnet Mask
  - On: Input the Subnet mask of destination/source.
  - Inputted Network Address and Subnet Mask will be calculated. Then, the result will be the target network address.
  - Off: Do not specify

### 3.8 Data Conversion Software

There is the utility software, which can convert data to the Pcap format file to use it in the Wireshark/Ethereal.

- 1). Copy "lepcapcv.exe" which is stored in the attached CD to the appropriate folder of the PC.
- 2). Connect Analyzer and PC through the USB cable.
- 3). Capture the communication data using ONLINE monitor function. ([RUN]->[STOP])
- 4). Double click on the "lepcapcv.exe".
- 5). Mark on [Convert].
- 6). Click [Get] to capture measured data into the PC and name the file.
- 7). The same name file of .pcap will be made.

 For more details of conversion software, refer to the "readme.txt" in the CD-ROM of the product.



## Chapter 4. PoE (Power over Ethernet) Measurement Function

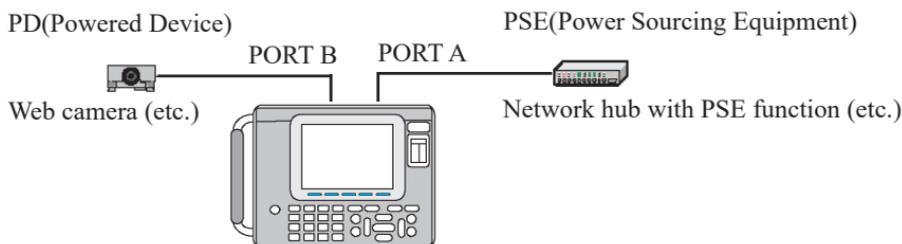
It measures the power (watt), voltage and current provided from the PSE device (Power Sourcing Equipment) supporting PoE (IEEE802.3af) to the PD (Powered Device). Also, it can distinguish the type of supplying power and appropriate power range.

To use this function, select "PoE" from the top menu.

### 4.1 Connection

Connect the target devices to the Port A and Port B of OP-SB89.

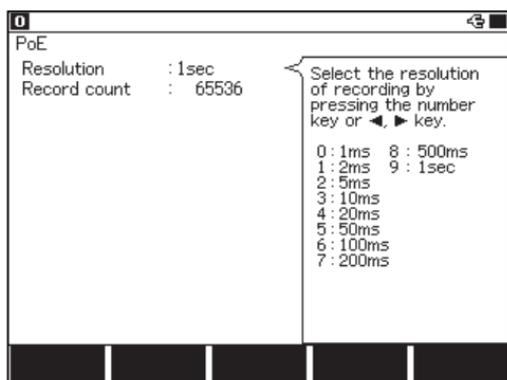
 Refer to the "3.1 Connection".



 Connection to PORT A and PORT B are compatible.

### 4.2 PoE Setup

Press [6] "PoE options" from the top menu.



#### ■Resolution

Select the measurement cycle (interval).

 On testing Cat 7 cable, "10ms" or more is to be selected.

#### ■Record count

Enter the number of times for recording.

 It stops measuring automatically when it reaches to the designated counts.

## 4.3 Start and Stop Measurement

Press [Run] and start measuring. The analyzer will stop measuring automatically when it reaches to the designated counts. Press [Stop] to finish measuring manually.

- Do not unplug the LAN cables during the measurement.
- Press [F5] to stop updating the display. Press [F5] again to display the latest data.

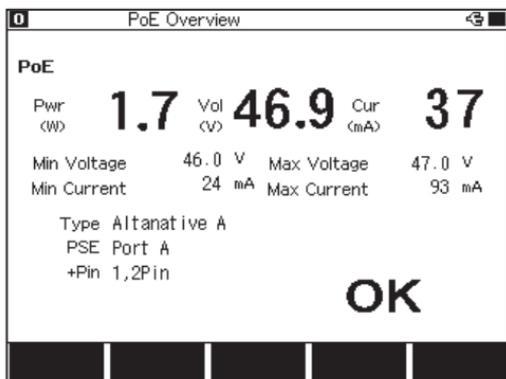
## 4.4 Display

Press [Data] key.

Switch the type of display in the order of “PoE Overview” display -> “PoE Dump” display -> “PoE Graph” display.

### ■PoE measurement display

It displays the result of PoE measurement.



Pwr : Power(W)  
Vol : Voltage(V)  
Cur : Current(mA)  
Min Voltage: Minimum voltage (V)  
Max Voltage: Maximum voltage (V)  
Min Current: Minimum current (mA)  
Max Current: Maximum current (mA)

Type : Type of supplying power (Alternative A or Alternative B)

- Automatically distinguish 'Alternative A' powered through pins No. 1, 2, 3, 6 from 'Alternative B' powered through pins No. 4, 5, 7, 8.

PSE : The port connected to Power Sourcing Equipment (PSE).

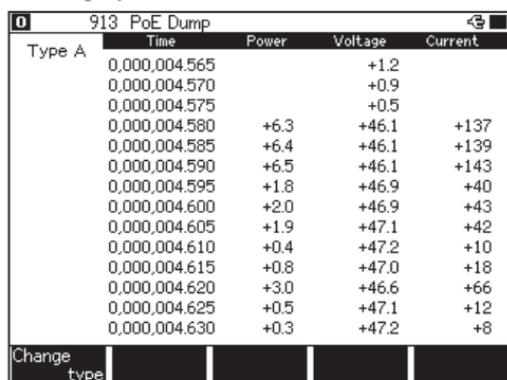
+ pin : The number of plus(+) pin.

OK/NG : Indicates "OK" when the voltage is in the range of 44V to 57V, and the power is less than 15.4W.

- The results of PoE measurement excepting voltage will be shown after the measured voltage has exceeded 22V for the first time in the measurement.

## ■PoE dump display

It displays the list of recorded data.



Type A	Time	Power	Voltage	Current
	0,000,004.565			+1.2
	0,000,004.570			+0.9
	0,000,004.575			+0.5
	0,000,004.580	+6.3	+46.1	+137
	0,000,004.585	+6.4	+46.1	+139
	0,000,004.590	+6.5	+46.1	+143
	0,000,004.595	+1.8	+46.9	+40
	0,000,004.600	+2.0	+46.9	+43
	0,000,004.605	+1.9	+47.1	+42
	0,000,004.610	+0.4	+47.2	+10
	0,000,004.615	+0.8	+47.0	+18
	0,000,004.620	+3.0	+46.6	+66
	0,000,004.625	+0.5	+47.1	+12
	0,000,004.630	+0.3	+47.2	+8

Time :Measuring time

Power :Power(W)

Voltage :Voltage(V)

Current :Current(mA)

[F1]: Change the type

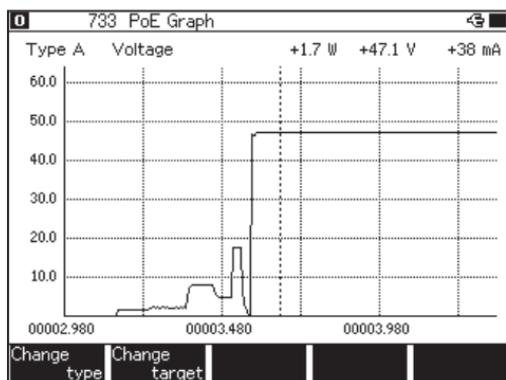
Switch the measured data on

Alternative A and on Alternative

B.

Scroll the window by [▲], [▼], [PageUp], [PageDown] keys.

## ■PoE graph display



[F1] : Change the type

Switch the measured data on

Alternative A and on Alternative

B.

[F2] : Change the target

Switch the target of display in the

order of "voltage" -> "current" ->

"power".

Move the cursor vertically by [◀] and [▶] keys.

## ■Save and utilize the measured data

PoE measured data can be saved as text format or CSV format. Therefore, you can utilize the data in the spreadsheet (etc.) on the PC.

Preparation: Insert a CF card or USB flash drive into the analyzer.

Press [Menu] -> [F2] -> [2] and set "Output" to "File(CF)" or "File(USB)" in the "Print out condition".

## How to save measured data of PoE

- ① Start the PoE measurement.
- ② Press [Data] to show PoE dump display.
- ③ Scroll and/or move the page to show the top of data you want to save.
  - ☰ Press [Top] to save entire data.
- ④ Press [Print] and assign number of pages you want to save by [0] to [9] keys.
  - ☰ 66 rows are saved per 1 page. To save entire data, assign large number (e.g. 99999).
- ⑤ Press [F1] and select the format from "normal" (text format) or "CSV".
- ⑥ Press [Enter]. The file is saved in the "PRINTOUT" folder of the CF card or USB flash drive in the specified output format.
  - ☰ When you set "Output" to "AUX" in the "Print out condition", it is able to export the measured data through the AUX (RS-232C) port.

### • Example of text format output

```

*=[LE-8200]====[2013-02-21 11:24:42]*
* Model      : LE-8200      *
* Version    : 1.02        *
* Extension  : OP-SB89     *
* Serial No. : XXXXXXXX    *
* Start time : 2013-02-21 11:23:42 *
* Stop time  : 2013-02-21 11:23:50 *
*-----*
* PROTOCOL  : IEEE 802.3af *
*   TYPE    :              *
*   PSE     :              *
*   PIN     :              *
*-----*

-----TM-----POWER-----VOLTAGE-----CURRENT-----
0,000,004.565 -- -- +1.2 --
0,000,004.570 -- -- +0.9 --
0,000,004.575 -- -- +0.5 --
0,000,004.580 +6.3 +46.1 +137
0,000,004.585 +6.4 +46.1 +139
0,000,004.590 +6.5 +46.1 +143
0,000,004.595 +1.8 +46.9 +40
0,000,004.600 +2.0 +46.9 +43
0,000,004.605 +1.9 +47.1 +42
0,000,004.610 +0.4 +47.2 +10
0,000,004.615 +0.8 +47.0 +18
0,000,004.620 +3.0 +46.6 +66
0,000,004.625 +0.5 +47.1 +12
0,000,004.630 +0.3 +47.2 +8
0,000,004.635 +0.7 +47.1 +16
0,000,004.640 +2.9 +46.7 +64
    
```

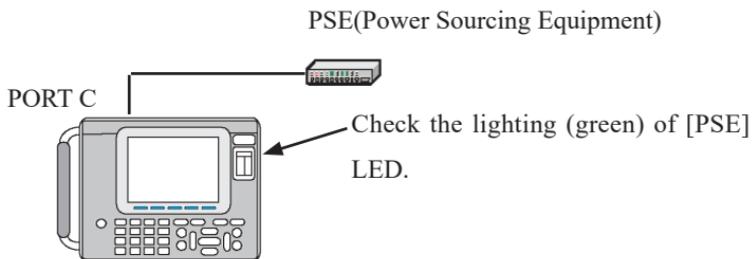
### • Example of CSV format output

913	--	1.2	--
914	--	0.9	--
915	--	0.5	--
916	6.3	46.1	137
917	6.4	46.1	139
918	6.5	46.1	143
919	1.8	46.9	40
920	2	46.9	43
921	1.9	47.1	42
922	0.4	47.2	10
923	0.8	47	18
924	3	46.6	66
925	0.5	47.1	12
926	0.3	47.2	8
927	0.7	47.1	16
928	2.9	46.7	64
929	4	46.7	86
930	0.3	47.2	7
931	0.7	47.1	16
932	3.2	46.6	69

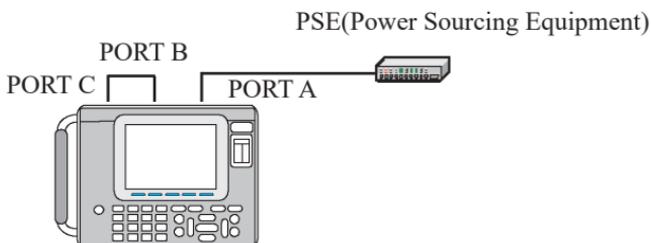
## 4.5 PSE(Power Sourcing Equipment) Detecting Function

---

The Port C of OP-SB89 works as the PD (powered device) port of PoE Class 1. When the cable plugged into the Port C receives the power from the PSE (power sourcing equipment), the line state LED for “PSE” lights up.



When connecting "PSE" and "Port A", "Port B" and "Port C" as following, it is able to know more intimate analysis on PSE powering type, voltage and so on. In this case, the PD on Port C is measured with approximately 4.7kΩ of load.



# Chapter 5 Statistic Function

---

The statistic function is a useful feature to analyze the network traffic and the frequency of the particular frames. To use this function, select [TREND] from the top menu.

## 5.1 Connection

---

Connect the target devices to the Port A and Port B of OP-SB89.

 Refer to the "3.1 Connection".

## 5.2 Interface Setup

---

Press [1] "Interface" from the top menu.

 Refer to the "Chapter 3. On Line Monitor Function".

## 5.3 Frame Counters

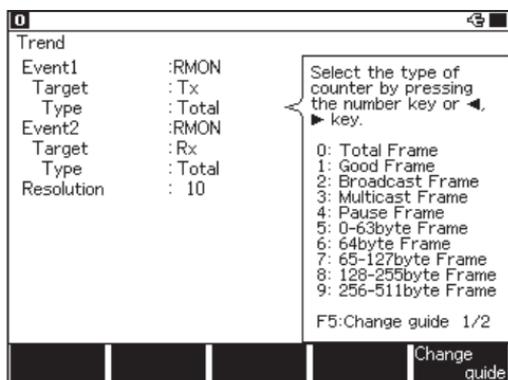
---

Start the measurement. Following frames are counted separately by transmission and reception. Select two kinds of frames for statistical analysis.

Total	: Total number of receiving frames
Good	: Number of normal frames
Broadcast	: Number of broadcasts
Multicast	: Number of multicasts
Pause	: Number of pause frames
0-63(Length1)	: Number of 0 to 63 byte packets
64(Length2)	: Number of 64 byte packets
65-127(Length3)	: Number of 65 to 127 byte packets
128-255(Length4)	: Number of 128 to 255 byte packets
256-511(Length5)	: Number of 256 to 511 byte packets
512-1023(Length6)	: Number of 512 to 1023 byte packets
1024-1518(Length7)	: Number of 1024 to 1518 byte packets
1519-Over(Length8)	: Number of 1519 byte packets and above
CRC error	: Number of CRC errors
Alignment error	: Number of alignment errors
Fragment error	: Number of fragment errors

## 5.4 TREND Setup

Press [7] "TREND option" from the top menu.



### ■Target

Select the target transmitting and receiving line.

Tx: The transmitting signal

through the 1, 2 pin.

Rx: The receiving signal through the 3, 6 pin.

### ■Type

Select the target frame counter.

 [F5]:Scroll the guide message.

### ■Resolution

Enter the calculation cycle (horizontal resolution of statistical chart).

## 5.5 Start and Stop Measurement

### Starting measurement

Press [Run] to start measuring.

### Stopping measurement

Press [Stop] to stop measuring.

The analyzer will stop measuring automatically after 2000 times of statistics.

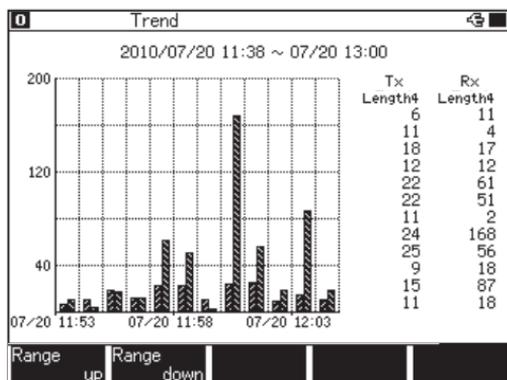
## 5.6 Display

Press [Data].

Switch the type of display in the order of "Trend"(Graph) and "Counter" display.

### ■ Graph display

The counted values of set cycle (resolution) are shown in the histogram.



[F3]:Auto-ranging ON / OFF

When the auto-ranging is "On", "Auto" is shown at the upper left of the display.

The range of vertical axis will be adjusted automatically.

[F1]:Range up

[F2]:Range down

When the auto-ranging is "Off", it is able to change the calculating cycle (resolution) of vertical axis.

After the measurement, scroll the window by [▲], [▼], [PageUp], [PageDown] keys.

### ■ Counter display

It shows the total numbers of each counter frame.

0 Counter

	Tx (1,2Pin)	Rx (3,6Pin)
Total	88001	130115
Good	88001	130115
Broadcast	372	3916
Multicast	0	226
Pause	0	0
0-63 (Length1)	0	0
64 (Length2)	71062	12965
65-127 (Length3)	7940	8283
128-255 (Length4)	1006	2694
256-511 (Length5)	2636	5507
512-1023 (Length6)	4343	3445
1024-1518 (Length7)	1014	97221
1519-Over (Length8)	0	0
CRC error	0	0
Alignment error	0	0
Fragment error	0	0

Maximum number of counts :  
4,294,967,295

# Chapter 6 PING Function

---

It is able to confirm the linking to the network by transmitting the PING commands. To use this function, select [PING] from the top menu.

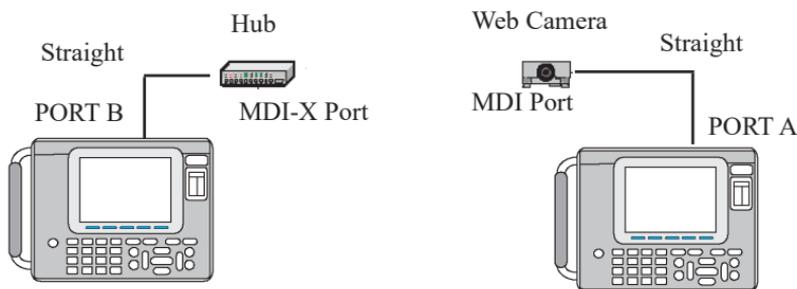
## 6.1 Connection

---

When utilizing the PING function, Port A works as the LAN port of MDI-X standard (No. 3, 6 pins for transmission/ No. 1, 2 pins for reception). Also, Port B works as LAN port of MDI standard (No. 1, 2 pins for transmission/ No. 3, 6 pins for reception).

Connect the LAN port of the target device to the Port A or the Port B of OP-SB89.

- ☰ If connecting the device with Auto MDI/ MDI-X port, it is able to use either of straight cable or cross cable.



## 6.2 Interface Setup

---

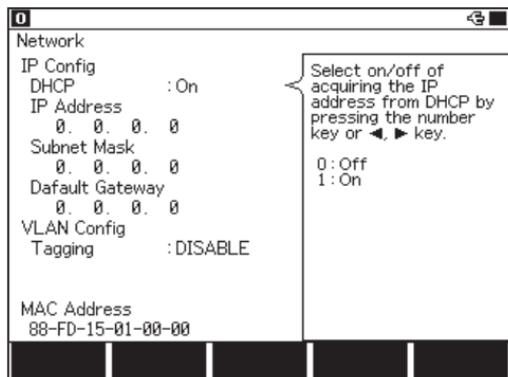
Press [1] "Interface" from the top menu.

- 📖 Refer to the "Chapter 3. Online Monitor".

## 6.3 Network Setup

Press [F] "Network" from the top menu then configure the network connection.

If connecting to the existing network of under the practical operations, consult with your network administrator discreetly and configure the following IP address.



### ■DHCP

Select "On" to connect to the DHCP server and obtain the IP address automatically.

Select "Off" to set the existing IP address.

### ■IP Address

Enter the IP address of OP-SB89.

### ■Subnet Mask

Enter the subnet mask.

### ■Default Gateway

To communicate over the router, enter the IP address of the router.

(Enter "0.0.0.0" if unnecessary).

### ■Tagging

Select "Enable" to use the VLAN tags.

### ■VLAN Id

Enter the ID number of the VLAN tag.

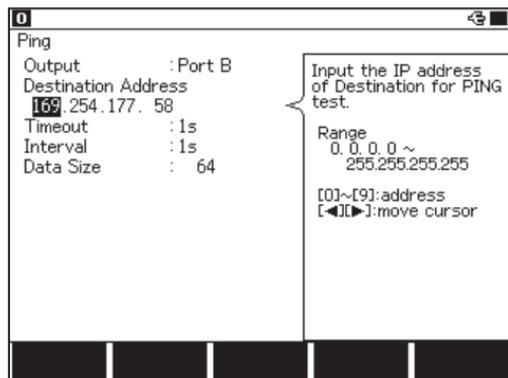
### ■MAC Address

The MAC address of the OP-SB89 will be displayed.

## 6.4 PING Setup

---

Press [8] “PING option” from the top menu.



- Output  
Select the port of OP-SB89.
- Destination Address  
Enter the IP address of destination.
- Timeout  
Select the timeout limit of Ping response.
- Interval  
Select the interval of repeating the Ping request.

### ■ Data Size

Enter the data size of Ping request packet (ICMP).

 For the normal testing, it is not necessary to change the default value (64).

## 6.5 Start and Stop Testing

---

By pressing [Run], Port A and Port B work as LAN ports, instead of TAP ports.

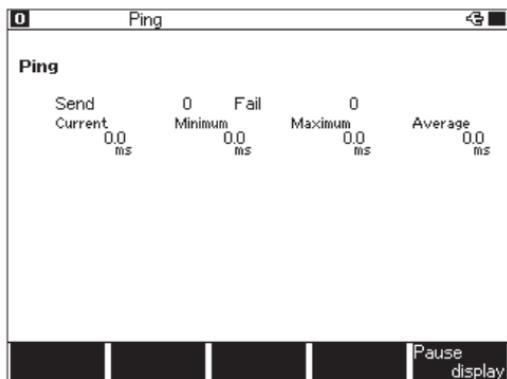
Then, the analyzer joins to the target network and starts the PING testing.

The analyzer will stop testing automatically and disconnect from the network after transmitting PING commands about 30,000 times.

Press [Stop] to stop testing manually.

## 6.6 Display

During the PING testing, the situation of test will be described as following.



Send :Number of times transmitted  
Fail :Number of times failed  
Current :Latest response time (ms)  
Minimum:Minimum response time (ms)  
Maximum:Maximum response time (ms)  
Average :Average response time (ms)

When the Ping commands cannot be transmitted successfully, following message will be appeared in the upper right of the display.

DHCP failed : Fail to acquire the IP address from the DHCP server.

Arp failed : Fail to find the Host.

Not link : Fail to link to the network.

Link lost : Fail to link during the transmission.

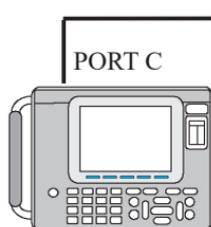
 Cannot record data and results.

# Chapter 7 Cable Test Function

Measure the length and status of the of LAN cables.  
To use this function, select [CABLE] from the top menu.

## 7.1 Connection

Connect the one-side of the cable into the Port C.



Do not connect anything to the other side of the cable.

## 7.2 Start and Stop Measurement

Press [Run] to start measuring.

The test results of the LAN cable connected into the Port C is shown at the display.  
Simply replace the cables and view the results of each cable.

Press [Stop] to stop measuring.

## 7.3 Display

Cable				
Status	Length			
NG	81 m			
Split	Break	Short	Point	
1, 2 Pair				m
3, 6 Pair	Detect		54	m
4, 5 Pair				m
7, 8 Pair				m

Change unit | Pause display

Status:

If there is no split pair, breaking (snapping), or shot circuit, "OK" will be shown.

Cable length:

Show the length of cables (3 to 120m).

1-2 Pair, 3-6 Pair, 4-5 Pair, 7-8 Pair:

Show the results of each paired of cables, such as split pair, breaking (snapping), short circuit, and the point of the problem.

[F1]: Switch the measuring unit either of meter (m) or feet (ft).

 Split pair test is valid only for the connectors directly connected to the analyzer.

## 7.4 Adjusting the Calibration of Coefficient

---

The calibration coefficient is used to calculate the cable length, and its default value is set on the basis of Category 5 LAN cable as the factory preset.

Adjust the coefficient if you need to measure the different category of cables or special kind of cables.

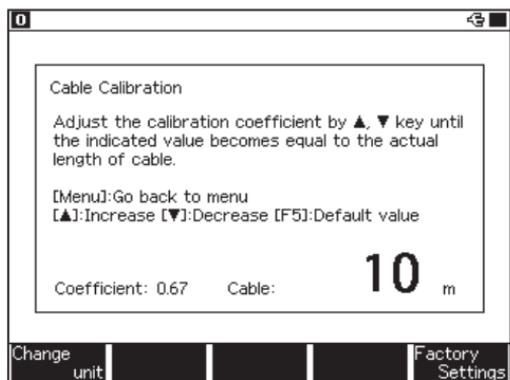
### Preparation

- 1) Prepare the cable which is the same kind of cable needed to be measured its length.
- 2) Use the cable, which is already known its length, and then connect it to the Port C.

 **Cable of approximately 10m long is recommended.**

### Procedure

- 1) Select "CABLE" -> [A] "Calibration" from the top menu.
- 2) Press [Run]. Adjust the calibration coefficient by using [▲] and [▼] keys until the indicated value becomes equal to the actual length of that cable.



[F1] : Changes the unit of the cable length.

[F2] : Makes the settings back to the factory settings.

# Chapter 8 Port Blink Function

---

Blinks the link LED of the network HUB connected to the Port A/B. This can help finding which LAN cable is connected to the which port of the HUB.

To use this function, select [PORT BLK] from the top menu.

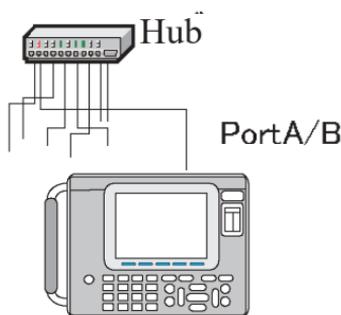
## 8.1 Connection

---

Plug the LAN cable connected to the HUB into the Port A or Port B.

Plug the cable into the Port B of MDI standard for the ordinary case.

Plug the cable into the Port A, if the cable is connected to the up-link port (etc.).



## 8.2 Searching Hub port

---

Press [Run]. Repeat linking and non-linking of PortA/B with 2 seconds of intervals.

Check the link LED of the target HUB and find the port, which is blinking at the same interval.

To stop blinking, press [Stop].

- ☐ The blinking interval could be different by the response time of the HUB.
- ☐ If unplug the cable during the test, blinking may be stopped. In this case, press [Stop] and [Run] again.

# Chapter 9 Maintenance

## 9.1 Troubleshooting

Problem	Cause/Lemedy	
Unable to monitor	Cause	1) The cable connection is wrong. 2) The "Interface" setting is incorrect. 3) The filter setting at "Configuration" is not appropriate for the target situation.
	Remedy	1) Check the cable type (cross or straight). 2) Set "On" the "AutoNegotiation" at "Interface". 3) Adapt the filter setting at "Configuration" to the target situation. (If the filtering is unnecessary, set "Off" the "Filter 1".)
Unable to use PING	Cause	Invalid configuration
	Remedy	Adapt the configuration of "PING options" and "Network" to the target network environment. Consult with the administrator of the target network.
Unabl to make power off	Cause	Unexpected events have been happened.
	Remedy	Press and hold the power key for a while.

## 9.2 Diagnostics (Self check)

Operates the self-diagnosis test

Press [F2] -> [6] from the top menu to show the Diagnosis display.

Read the instructions and press [F1] to run the self-diagnosis.

- ☞ Try to use this function if wondering the product malfunction.
- ☞ If the keyboard image is shown on the display, press all keys one by one and change its colors on the display.

# Chapter 10 Specification

Interface	Port A,B : 10Base-T/ 100Base-TX (IEEE802.3) , PoE (IEEE 802.3af) MeasurementPort C : Cable Test Port, Dummy PD port to detect the PSE
Monitor Function	Measures/records the LAN frames by TAP connection of A/B ports. <sup>(*)1</sup> Frame size: 60~2047byte, Time stamp (13 digits, MIN resolution: 1μs,). Auto stop for full memory (ONLINE mode), Continuous recording (REPEAT mode) <sup>(*)2</sup> , External signal trigger
Recording Frame	Max. 48,000~1,388,000 frames (equivalent MAX 100M bytes) <sup>(*)3</sup>
Detailed display	Translatable protocol : IPv4, ARP, ICMP, TCP, UDP, DHCP Conversion software for Ethereal / Wireshark (.pcap format) is being released. <sup>(*)4</sup>
Filter Function	Monitors only specified frames.
Auto save Function	Saves the measured data as Communication log files to CF card during the measurement(only on REPEAT mode)
Retrieval Function	Retrieves the specified frame and display/count.
Statistic Function	Calculates 2 kinds of frame counters at the same time with specified interval (1~240 minute) , and displays in graph. Display all frame counters at real time.
PoE Measurement Function	Measures/continuously records the power consumption/Voltage/Current/Power(Alternative A/B, power supply direction, polarity), OK/NG statement. Max recording time : 400 millions, Voltage: 0~60V (±1% F.S.), Current: 0 ~ 380mA (±2% F.S.).
PSE Detection Function	Detects the PSE connection to the Port C (Dummy PD port of class A) and light the LCD.
Cable Test Function	Measures the cable length, breaking/short circuit, split pair detection <sup>(*)5</sup> Method of calculation of length: TDR, Measure Range : 3~120m, Margin of error: ±1m (3 ~ 20 m) /±5% (more than 20m) <sup>(*)6</sup>
PING Function	Transmits the PING commands and displays the response.
Port Blink Function	Periodically repeats the lighting ON/OFF of link LED of the hub connected to the analyzer.
Components	Interface expansion board, Line state sheet C, LAN cable, Utility

\*1 : Port A/B has the fail-safe TAP.

\*2 : REPEAT mode uses the two-divided Buffer memory alternately to record data continuously.

\*3 : 12 bytes of additional information will be added for each frame.

\*4 : The operating environment of the conversion software "lepcapcv" to pcap format is Windows 7/8.1/10.

\*5 : It cannot display the cable map, because of the open measurement method.

\*6 : It is the standard margin of error for Category 5e cable.





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