

LINEEYE®

Fully supports the development, testing and maintenance of communications equipment and information systems to help you make the jump to IT.

UPGRADE

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NEW

Multi Protocol Analyzer

LINEEYE LE-3100/2100/1100

High-performance Portable Communications Analyzer Series Capable of On-line Monitoring, Simulation and BERT



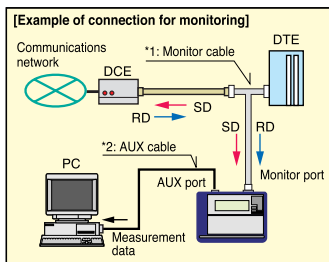
- RS-232C ●High-speed Communications ●High-capacity Buffer Memory
- Memory Card Interface ●Outputting Measurement Data during Monitoring
- Printing/Saving Measurement Data on PC. ●PPP Translation

The industrial world's move to IT has made necessary communications and measurement equipment that enables users to quickly, easily and efficiently link to complicated high-speed networks. The LINE EYE Series meets these demands with high-speed communications processing, miniaturization and proven multiple protocol analysis technology. These instruments are a necessary tool for stepping into the IT age, as they can be used for everything from development and testing of communications systems and equipment to communications network maintenance.

Upgraded Basic Performance

• Data Output while Monitoring is in Progress

Communications are possible up to a max. 115.2 kbps. Separate speeds can be set for transmission and reception. Data is displayed on a large LCD and simultaneously stored in memory in real-time. And, still at the same time, the same data can be output via the AUX port to an external device such as a PC, all while monitoring is in progress.



*1: DSUB 25-pin connector included (DSUB 9-pin connector is optional)
*2: Optional

• Supports RS-232C (V.24) and Numerous Communications Interfaces

LINE EYE supports RS-232C as a standard feature, but other interfaces are supported through expansion ports. With an optional adapter connected to a dedicated port, LINE EYE supports also current loops, RS-422, RS-485, TTL, infrared communications and other interfaces.



Example of connection with optional adapter (OP-5B)

• Large 192KB Memory Buffer

Incorporates a large memory buffer for long-term measurement. Other features include a convenient 2-dividing ring buffer for comparing data and protection to safeguard data against misoperation or mishandling. Also, the memory is backed up by an internal battery that lets users keep measured data and measurement conditions almost indefinitely.

• Built-in Memory Card Interface

These purpose-specific memory cards can be used in 2 ways: file mode and buffer mode. In the file mode, users can store up to a maximum of 100 files of measured data and measurement conditions. The date and the file name are also recorded to enable easy management. In the buffer mode, a loaded card acts as expanded memory space, boosting storage area to a maximum 1.2MB (Max. storable data: Approx. 300 ~ 600KB).

*1) 4 bytes of memory are required for every capture of communications data, idle time and time stamps. With full-duplex, data transmission and reception are performed simultaneously, whereby greatly improving buffer recording efficiency.

[File management display]

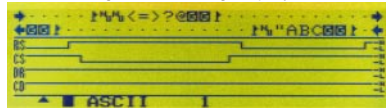


On-line Monitoring

• Multiple Protocol Support for the Internet Age

Incorporates a PPP translator effective towards analyzing internet communication systems. The top-of-the line models support many protocols that provide bit serial transmission and polarity modulation (NRZ/NRZI), including HDLC and packet communications (ITU-T X.25).

[Interface signal line timing display]



[X.25 translation display]

TH	AD	TYPE	NS	P/F	NR	DATA	FCS
163940	12	UA					
163942	12	RR				3129232435	
163944	12	INFO	0	0	0	4041574140	
163946	12	INFO	1	1	2		
163948	12	RR					

[PPP translation display]

TH	PROTOCOL	CODE	ID	DATA
190602	PAP	CONF-REQ	1	0024
190602	PAP	CONF-ACK	1	0005
190602	IPCP	CONF-REQ	1	0010
190602	IPCP	CONF-REQ	1	0025
190602	CCP	CONF-REQ	1	000F

• Time Stamp and Idle Time Measurement

The date and time of transmission/reception are recorded on data frames. Then, using an auto run-stop feature with which the user specifies measurement start and end times, measurements can be performed unattended and the time of errors easily and comfortably checked later. LINE EYE can also measure the amount of idle time between communications frames and closely monitor transmission/reception response and communications timeout status.

[Time stamp and idle time display]



• Trigger Feature

The trigger feature lets you specify a communications event as the trigger condition and have measurement operations executed automatically when that condition is satisfied.

Up to 4 pairs of conditions and operations can be set, which is helpful towards identifying frequent intermittent faults that occurs with communications systems.

[Trigger setup display]

TRIGGER	FACTOR	ACTION
TRIGGER 0	CHARACT	SAVE
TRIGGER 1	ERROR	BUZZER
TRIGGER 2	CHARACT	TOP
TRIGGER 3	EXTERNA	STOP

• Auto Communications Condition Setting

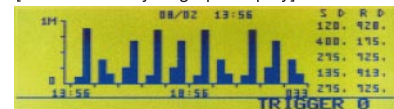
Data on the communications line can be analyzed and settings such as baud rate and data framing automatically set based on findings. This is effective for monitoring lines of unknown communications conditions.

NOTE: Auto setting may be disabled when there is little data on the communications line.

• Statistical Analysis Capabilities (LE-3100 only)

The number of occurrences of a selected target event (data, packet, specific type of error, etc.) can be tabulated for a unit time and plotted on a graph. This makes it possible to accurately identify the changes in traffic in specific time periods (line use frequency) and the time distribution of errors. The unit of time used can be selected from 10 min, 1 hr and 4 hr, while up to a maximum 200 events can be used in statistical processing.

[Statistical analysis graph display]



• Analysis of Interface Signal Line

2-color LEDs indicate (red-green-out) signal high/low level and disconnection, making it easy to confirm cables are connected. Also, using the delay time feature, the change in delay time of individual signal lines can be measured in 0.1 ms resolution.

[Delay time measurement display]

CURRENT	411.8J	CONDITION
TIME	99J	SARSEBACSBACBACBAC
MAX	432.7J	ST#0*****
AVE	363.4J	SP*****
MIN	405.1J	

LE-2100/LE-3100

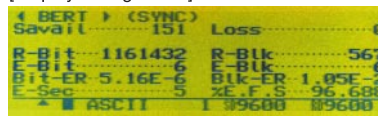


*) LE-1100 is not provided with the ST1, ST2 and RT LEDs.

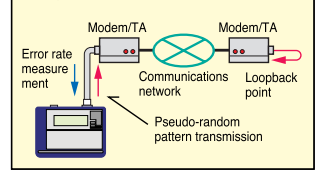
BERT (Bit Error Rate Test)

As a standard feature, the LINE EYE comes with a ITU-T G.821-conforming BERT feature. It lets you evaluate communications quality and identify fault points on communications lines, including modem and terminal adapters, in loopback tests and comparison tests using a simulated random pattern. It provides capabilities comparable to purpose-specific hardware, such as bit error interrupts by key operation, long continuous measurement, as well as measurement results printout and electronic output.

[Display during BERT]

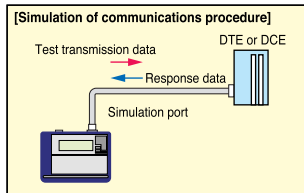


[Example of connection for BERT function]

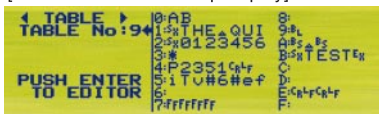


Simulations

LINE EYE comes standard with simulation capabilities effective for communications system development and testing stages. LINE EYE can be connected to target systems to efficiently monitor and verify transmission/reception exchanges. With a dedicated editor that enables copying, pasting, filling and capturing of 16 types of transmission data, data can be registered in transmission tables and used in the various modes.



[Transmission table setup display]



MANUAL mode

The MANUAL mode lets you send the data registered in transmission table which correspond to the "0" to "F" keys. The data can be sent with the press of a key. While checking replies from a unit under development with the LINE EYE's monitoring feature, you can easily and simply test the communications process. You can also send fixed data by registering it under a key combination of the SHIFT and "0" to "D" keys, as well as turn RS and ER signal lines on/off with the SHIFT and "E"/"F" key combinations.

MATCH mode

In the MATCH mode, when "SEND" is selected as the trigger action and that condition is satisfied, registered data can be sent after a set amount of reply time elapses. By triggering a reply transmission with a specific type of data or error as the trigger condition, timeout processing and error response operations can be easily checked.

FLOW mode

Flow control can be simulated on the transmission and reception-lines using X-on/off flow control or the control line handshake. In the transmission mode, up to 16 cycles of data from transmission start until an interrupt request is generated can be displayed. In the reception mode, users can set the number of received data cycles until a transmission interrupt request is generated, as well as the time until the transmission resume request is generated.

[FLOW mode (SEND) setup display]



ECHO mode (LE-2100 and LE-3100 only)

In the ECHO mode, LINE EYE internally returns received data in units of bits, bytes or frames (character string). It is used to test display terminals and communications terminals, and to set loopback points for the BERT feature.

POLLING mode (LE-2100 and LE-3100 only)

The POLLING mode simulates the slave and master units in multidrop (1:N connection) polling protocols. In the slave mode, the LINE EYE checks the number of received frames that are assigned the LINE EYE's address and whether errors occur or not, replying with user-set data. In the master mode, LINE EYE sends polling messages to 32 slave units, and checks and displays replies from each slave.

BUFFER mode (LE-3100 only)

In the BUFFER mode, you can select between transmission and reception, and send transmitted or received data that has been captured in the buffer using the unit's monitoring capabilities, as simulation data without requiring further manipulation. This mode is effective in conducting reproducibility tests using the same data as that monitored under actual communications conditions.

PROGRAM mode (LE-3100 only)

The PROGRAM mode flexibly simulates communications protocols by letting the user program operations with purpose-specific commands selected from menus. There are 32 commands to utilize such as SEND for enabling data transmission, WAIT that waits for a specific type of received data, control line status or time to elapse, and IF for judging various conditions. Also, since labels can be used for the destination of CALL and branch commands, programs can be easily revised and added to. As a result, anyone can quickly master programming with the LINE EYE.

[PROGRAM mode commands]

Command	Operation
SEND CHR	Sends max. 8 data sets.
SEND REG	Sends data registered in transmission table under specified REG No.
WAIT CHR	Waits until receiving specified data (max. 8 data sets).
WAIT FRM	Waits until receiving 1 frame.
WAIT TM	Waits for specified amount of time.
GOTO L	Jumps to specified label No.
CALL L	Jumps to subroutine of specified label No.
IF CHR = L	Branches if specified data in reception buffer.
IF LN = L	Branches if interface line is specified logic.
SET REG	Sets or increases/decreases value of specified REG No.
SET TM	Controls specified timer and sets to specified value.
INT TRG O L	Interrupts specified label when trigger 0 condition is satisfied.

Packed with Easy to Use Handy Features

• Menu-based Simple Operation

Functions are easily selected from menus. Operation is standardized for the entire series, so you can freely replace lower-end models with higher-end models, and vice-versa.

[Top menu display]



• Off-line Analysis with Searching and Counting

Any range of data saved in the buffer can be scrolled, paged and displayed in units of 1 character, 1 line or 1 page. Also, a formidable search engine makes it possible to search for specific data, errors, time stamps, etc. And, it tells you how many of the search items are found in the buffer.

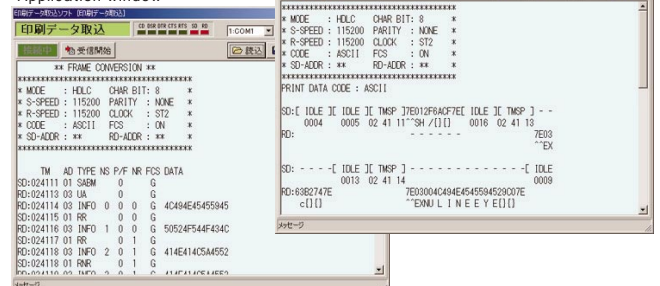
• Remote Control

Remote control commands standardized for the entire series are adopted. Use of optional PC software (LE-PC200) allows you to start measurement via PC and to record the monitor data on PC continuously.

• Data Printing and Saving on PC

Users can print out measurement data of a user-specified range in a continuous format. And, with a dedicated printer, it is possible to make hard copies of windows just as they appear on the monitor. And, the optional application LE-PC100 lets you upload print data to a PC via the AUX (RS-232C) port, and create and save text files of printout formats and bitmapped files of hard copies, making it easy to analyze data and create reports on PC.

• Application window

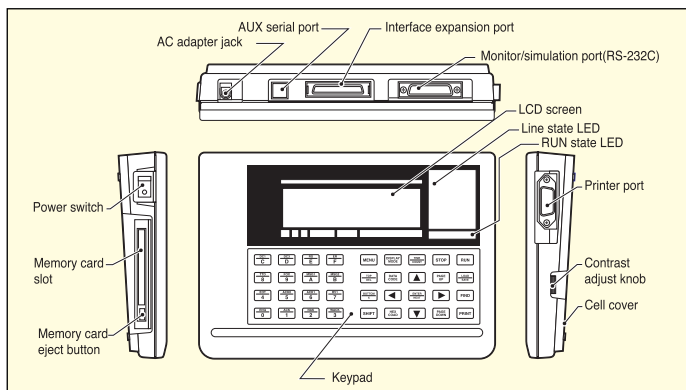


Specifications

	LE-3100	LE-2100	LE-1100
Interface	RS-232C/V.24(Standard) Current loop, RS-422, RS-485, X.20/21, VT.35, TTL, IrDA(Optional)		
Protocol	Asynchronous : ASYNC Character synchronous : SYNC, BSC, Bit-oriented synchronous : HDLC, SDLC, X.25 (NRZ/NRZI)		Asynchronous: ASYNC
speed	Max. 115.2Kbps in all protocols/modes		
Internal clock (bps)	50,75,100,110,134.5,150,200,300,600,1200,1800,2000,2400,3200,3600,4800,7200,8000, 9600,12000,12800,14400,16000*, 16800*, 19200,28800,32000*, 38400,46000, [48000]*, [50000]*,[56000]*, 57600,64000*, [72000]*, 76800,115200 (For transmission and reception independently) Speed with [] is not available in ASYNC. Speed with * is not available in mode in which synchronous clock is extracted from the received data.		
Data code	ASCII,EBCDIC,JIS7,JIS8,Baudot,Transcode,IPARS,EBCD,EBCDIK,HEX		
Character framing	ASYNC : Data bit (5/6/7/8) + parity bit (0/1) + stop bit (1/1.5/2) [Stop bit 1.5 is not available for LE-1100.]		
	SYNC, BSC : Data bit + parity bit (total 6, 8 bits)		—
	HDLC, SDLC, X.25: Data bit + parity bit (total 8 bits)		—
Parity bit	None, odd, even, mark, space		
Bit order	LSB first or MSB first, selectable		
Polarity inversion	Normal or inverted, selectable		Normal only
Error check	Parity (none, odd, even, mark, space), framing, abort, short frame, BCC (none, LRC, CRC-6, CRC-12, CRC-16, CRC-ITU-T)		Parity (none, odd, even), framing, BCC (none, LRC)
Memory capacity	Capture memory : 192K bytes (96K characters) One area or two divided areas, selectable: Data protection enabled Simulation data memory: 8192 characters (Divisible into a maximum of 16 types of data string)		
Memory/clock backup	About 5 years with built-in lithium battery		About 30 days with built-in NiCd battery
Monitor function	Handles half-duplex and full-duplex communications. Idle time display (max. 999.9 s; resolution: 10ms, 100ms) Time stamp display (day/hour/min. or hour/min./sec.) Lead Status display (RS, CS, ER, DR, CD, SQD, CI and EXIN)		
Protocol translation	SDLC, HDLC (LAPB, LAPD), ITU-T X.25 frame/packet, BSC, PPP		BSC, PPP
Bit shift display	Data can be rotated by the bit and displayed in SYNC		—
Lead status LEDs	2-color LED: (Red: H level logic, Green: L level logic, Off: Not connected) SD, RD, RS, CS, ER, DR, CD, SQD, CI, ST1*, ST2*, RT* [*mark is not available for LE-1100]		
Data search function	Search data from capture memory and displays / counts them. Data frame up to 8 characters ("don't care" and "bit masking" assignable). Idle time not less than preset value. Time stamp data ("don't care" assignable). Error (parity, framing, BCC, break/abort and short frame assignable). Trigger point		
Auto Configuration	Measurement conditions such as protocol, transmission speed (50 ~ 115.2Kbps), data code, synchronous character and BCC check can be set.		
Auto run/stop	Start and stop time of various measurement tests can be specified.		
Delay time function	Measures the time (0.1 ms resolution) between changes of Lead status.		

	LE-3100	LE-2100	LE-1100
Timer/Counter	Interval timer: 2 kinds (Max. 65535: resolution 100ms or 10ms), Universal counter: 2 kinds (Max. 65535), Counters for SD and RD characters (Max. 4294967295)		
Statistical analysis function	Statistics (characters, frames, satisfied trigger conditions) are collected and displayed in graphs on selectable time basis.		—
Trigger function	Four pairs of "condition" and "action" to be taken when the condition is satisfied can be set. Trigger condition : Preset character ("don't care" and bit masking assignable; up to 8 characters), error (error type individually assignable), timer/counter value matching, logical status of interface signal line, external trigger input, and capture memory full Trigger action : Stop measurement test (offset assignable), timer control (start/stop/restart), counter control (count/clear), buzzer, external signal output, save monitor data onto memory card, send preset characters (for simulation)		
Bit error rate test (BERT)	Error rate measurement test in accordance with ITU-T recommendation G.821 is possible. Pattern : 2 ⁶ -1, 2 ⁹ -1, 2 ¹¹ -1, mark, space (Error bit insertion enabled with key operation.) Range : Bit error counting, block error counting (0 - 99999999 - 9.999E9), bit error rate, block error rate, SYNC loss frequency, Savall (operating time), %EFS (normal operation rate)		
Simulation functions	Enables communications procedures to be checked by sending the specified data		
Manual mode	Data are assigned to operation keys: Data can be sent by pressing the key while checking the monitor data on display.		
Match mode	Sends specified data when the trigger condition is satisfied. (Used together with trigger function.)		
Flow control mode	Simulates flow control protocol by X-on/off or RTS/CTS (sender/receiver selectable)		
Echo mode	Loop-back transmission of received data (by bit, data or frame)		
Multi-polling mode	Simulates multi-polling protocol. (slave/master selectable)		—
Buffer mode	Select and resend SD or RD in capture data	—	—
Program mode	Simulation commands: 32; Program steps: Max. 512; Data string: Max. 8192; Lead status: Programmable		—
Display	Graphic LCD with back-light		Graphic LCD without back-light
Memory card interface	Dedicated SRAM card up to 1MB available File mode : Used to save/load configuration data, capture data or simulation data (up to 100 files) Buffer mode : Can be used as expanded buffer memory for capture		
AUX serial port	RS-232C (mini DIN 8-pin): Up to 115.2Kbps Used to input/output configuration data, capture data or simulation data to PC		
Printer interface	Parallel (14-pin female) or RS-232C (mini DIN 8-pin), selectable; Hard copy and printing capture data on continuous format		
Power supply	Built-in rechargeable battery (Approx. 6 hours of operation) or AC adapter (AC100-240 V, 50/60Hz)		
Dimensions	39 (H) x240 (W) x170 (D) mm		
Weight	Approx. 980 g	Approx. 950 g	Approx. 940 g
Temperature	Working range: 0 to 40 °C ; Storage range: -10 to 50 °C (Humidity: up to 90% RH non-condensing)		
Accessories	RS-232C/V.24 monitor cable: 1; AC adapter: 1; Carrying bag: 1; Instruction manual: 1; Warranty (with customer card): 1		

Controls, Indicators, Connectors



Standard Set

- RS-232C/V.24 monitor cable: 1
- AC adapter: 1
- Carrying bag: 1
- Instruction manual: 1
- Warranty (with customer card): 1

Optional Accessories

Name	Model No.	Specifications/Remarks
Current loop adapter	OP-1B	For 20/60mA (terminal block)
RS-422/RS-485 adapter	OP-2B	Conformed to asynchronous RS-422/485 (DSUB 9-pin)
X.20/X.21 adapter	OP-3B	Conformed to X.20/X.21 standard, synchronous RS-422/485 (DSUB 15-pin)
V.35 adapter	OP-4B	Conformed to V.35 standard (M type, 34-pin)
TTL probe pod	OP-5B	TTL level communications (test clip)
Infrared communications adapter	OP-6B	Conformed to IrDA 1.0 standard, ASK (manual speed change)
Memory card	MC-256S	Capacity: 256KB
	MC-512S	Capacity: 512KB
	MC-1MS	Capacity: 1MB
Compact thermal printer	DPU-414-CA	Battery-powered, Dedicated AC adapter, cable and paper included
Monitor cable 5	LE-259M1	DSUB 9-pin male/female 1 each, Y cable for monitor: 1.5 m
AUX cable 1	LE2-BC	Mini DIN 8-pin - DSUB 25-pin connector attached, 1.5m, for DTE
AUX cable 2	LE2-8M	Mini DIN 8-pin - DSUB 25-pin connector attached, 1.5m, for DCE
AUX cable 3	LE2-BV	Mini DIN 8-pin - DSUB 9-pin connector attached, 2.5m, for DTE
Printed data capture software	LE-PC100	Windows® 2000/Me/98/95 application; AUX cable 3 included; Enables printed data to be saved/reproduced in text or BMP format.
PC buffering software	LE-PC200	Windows® 2000/Me/98/95 application; AUX cable 3 included; Enables monitored data to be saved continuously or to be converted to text or CSV format

Compact Thermal Printer DPU-414-CA



LE-7000

High-performance Portable
Communications Analyzer
Supporting Baud Rate
of up to 1.54Mbps

SAFETY WARNING

Read the instruction manual provided with the product before use and use the
product as explained in that manual. Using the product in ways not guaranteed in
the manual, connecting it to systems outside of the specified ranges and remodeling
can all cause trouble and damage. LINE EYE CO., LTD. will assume no responsibility
whatsoever for trouble or damage arising because of unauthorized ways of use.

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LINE EYE CO., LTD. is a venture company founded by electronic equipment development members of the
former Sekisui Chemical CO., LTD. with investment from the Sekisui Venture Fund. The electronic equipment
business of Sekisui Electronic CO., LTD. was transferred to LINE EYE CO., LTD. in October 2000.

This product was manufactured on consignment at an ISO9001-certified factory of the Sekisui Group.