

CANoe.LIN 7.1

The Comprehensive Development, Analysis, Stress and Test Tool for LIN and J2602

Highlights

- > Full support of all LIN protocol versions including J2602
- > Easy simulation of nodes and networks according to LDF
- > Implementation of Slave Conformance Tests for LIN and J2602
- > Advanced LIN stress and test functions

LIN (Local Interconnect Network) is a cost-effective and deterministic communication system for connecting ECUs with smart sensors, actuators and controls. Vector's software tool CANoe.LIN provides you with unrivaled features for developing, analyzing and testing LIN networks according to the specifications **LIN1.x**, **LIN2.0**, **LIN 2.1**, **SAE-J2602 (US-LIN)** and **Cooling-Bus**.

Applications

CANoe.LIN is capable of fully simulating up to 32 LIN networks and any number of nodes. Together with its integrated CAN features, this is the ideal tool for developing and testing LIN nodes (Master and Slave), CAN-LIN gateways and CAN-LIN diagnostics.

Development Features

- CANoe.LIN offers you sophisticated LIN development features:
- > Easy simulation of LIN nodes/networks according to LDF (including multi-channel LIN Masters and gateways)
 - > Full support of LIN2.0/LIN2.1 Slave reconfiguration
 - > Network management for LIN2.0/LIN2.1 and J2602
 - > Script functions for modeling LIN nodes (including diagnostics)

- > User-configurable and integrated panels for interactively manipulating signals, frames and scheduling

Analysis Features

CANoe.LIN provides you with the professional analysis features of CANalyzer.LIN (see also separate data sheet):

- > Network analysis according to LDF
- > Interpretation of LIN2.0/LIN2.1 configuration commands
- > Interpretation of diagnostic frames according to CANdela files
- > Detailed error and event detection
- > Numerical and graphical visualization of signals
- > Network Management Window
- > Network and node statistics with new LIN Network Monitor
- > Logging, replay, filter and trigger blocks
- > Programmable oscilloscope trigger

Timing Analysis

Via special LIN Trace Columns and the LIN Analysis Feature Set, you can directly access highly accurate timing information, e.g.:

- > Header, response and total frame transmission time
- > Schedule slot delay time, interframe space and bus idle time
- > Sync break, sync delimiter, and inter-byte space
- > Header and response tolerance
- > Wake-up signal length
- > Baud rate of header and response

Statistic	Current / Last	Min	Max	Avg
Errors Bus [total]	3	-	-	-
Errors Resp [total]	2	-	-	-
Errors Resp Detected [total]	0	-	-	-
Diag No Resps [total]	0	-	-	-
Busload [%]	0.00	0.00	13.88	5.56
Frames [fr/s]	0	0	25	11
Frames [total]	3943	-	-	-
Frames Cycle [ms]	220.01	5.79	1540.07	222.04
Baud Rate Master [bit/s]	19230	19230	19230	19230
Baud Rate Dev. Master [%]	0.16	0.16	0.16	0.16
Tolerance Header [%]	18.55	17.65	18.71	18.56
Tolerance Resp [%]	0.57	0.57	1.04	0.57
SeatECU	0.57	0.57	0.57	0.57
Motor1	0.57	0.57	0.57	0.57
Motor2	0.57	0.57	1.04	0.58
Duration Header [ms]	2.096	2.080	2.099	2.096
Duration Resp [ms]	4.707	1.569	4.707	2.980
Motor1	4.707	1.569	4.707	1.635
Motor2	3.661	3.661	4.707	3.664
Resp Space [µs]	3.0	0.0	33.0	3.0
Sleep Commands [total]	3	-	-	-
Wakeups [total]	2	-	-	-
Wakeups Duration [µs]	1001.1	1001.1	1001.1	1001.1
Init Time Master [ms]	101.090	101.084	101.090	101.087
ETF Resps / Headers [total]	0 / 975	-	-	-
ETF Invalid Resps / Head...	3 / 975	-	-	-

New LIN Network Monitor

New LIN Stress Interactive Generator

Action	Frame Id	Frame Name	Length Exp.	Length Trans.	Header	Response	Channel
Send Frame	0x3C	Read by Identifier	8	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LIN 1 (LIN)
Send Header	0x3D	SlaveResp	8	8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIN 1 (LIN)
Send Frame Error	0x2D	MotorsControl	2	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LIN 1 (LIN)
Add Frame...					<input type="checkbox"/>	<input type="checkbox"/>	

Header Length [bits] / [ms]	Break Length [bits]	Delimiter Length [bits]	Sync Byte	Inter-byte [bits]	PID Byte	Parity Bits [P1 P0]
38 / 1.979	18	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10

Hardware Interfaces for CAN and LIN

CANoe.LIN supports Vector's XL-Interface Family of high performance and flexible PC interfaces for CAN and LIN. For detailed information, please see the data sheet 'Hardware Interfaces for CAN and LIN'.

Design Tool for LIN

DaVinci Network Designer LIN is a dedicated tool for the design of LIN1.x, LIN2.0, LIN2.1 and J2602 networks. Together with the DaVinci Network Designer CAN and FlexRay, you can also define gateways. For detailed information please see this product's data sheet.

Test Features

Using the Test Feature Set (TFS) for LIN, you can easily define, control and report your own LIN tests. With the Slave Conformance Test Module you can directly integrate conformance tests into your own test configurations. This special test module supports **LIN1.3, LIN2.0, LIN2.1** and **J2602 conformance tests** for OSI-layers 2 and 3. A ready-to-use implementation of the LIN2.0 Master conformance test for OSI-layers 2 and 3 is also included in the scope of delivery.

You can also test Master nodes or complete LIN networks without stimulation using the sophisticated checks provided by the Test Service Library (TSL) for LIN, e.g.:

- > Schedule table transmission according to LDF
- > Diagnostic delay times according to LDF
- > Header and response tolerance
- > Sync break and delimiter times
- > Baud rate accuracy of Master node
- > Format of reconfiguration commands
- > Master initialization time
- > Wakeup signal and wakeup sequences
- > Event-triggered frame

Typical application tests and gateway tests can be easily defined using XML checks. With the script language CAPL even the most complicated test cases can be realized.

Stress Features

To stress your LIN network with CANoe.LIN, no special hardware is required. Using the new LIN Stress IG or the LIN Stress Feature Set you can create almost every type of LIN error, e.g.:

- > Invalid parity ID/sync byte/checksum
- > Invalid sync break/delimiter
- > Short message error/no response/collision
- > Disturbance of recessive and dominant bits
- > Transmission of arbitrary bit streams (also as a response)

Further functions are available for manipulating the LIN protocol during the measurement, e.g.:

- > Baud rate and Master/scheduling jitter
- > Sync break/sync delimiter/wake-up length
- > Interframe/interbyte space

Database Utilities

The following LIN database utilities are delivered with CANoe.LIN:

- > The **LIN File Editor** is a text-based editor for LDFs/NCFs with an integrated consistency checker
- > The **LIN Network Viewer** provides a graphical view of your LDF
- > With the **LIN Schedule Designer**, you can edit the schedule table section of your LDF

For more information about Vector's LIN solutions please visit:
www.lin-solutions.com

New Functions in Version 7.1

Full Support of LIN Diagnostics

- > Native support for LIN of Diagnostic Feature Set including Fault Memory Window and Diagnostics Console
- > Support of test modules with diagnostics on LIN bus
- > Use of diagnostic parameters defined in LDF
- > Automatic switching of diagnostic schedule tables
- > Direct sending of diagnostic requests without Master simulation
- > New LIN Diagnostics Tester demo

New LIN Network Monitor Window

- > Displays LIN-specific network and node statistics
- > Detailed error statistics with color-highlighting
- > Relevant node timings e.g. response space and response tolerance
- > Statistics for event-triggered and diagnostic frames
- > Statistics for network management

New LIN Stress Interactive Generator

- > Single shot sending of valid and invalid frames, headers or responses
- > Easy configuration of every type of invalid header and/or response
- > Easy configuration and sending of diagnostic requests/responses – including valid and invalid LIN2.x configuration commands

Other Improvements

- > New Trace columns for Slot Delay, Interframe Space, Bus Idle, Baudrate Master (measured), Baudrate Response (measured)
- > Extended support of J2602 Slave conformance tests
- > New functions added to LIN Analysis Feature Set for configuring the max. tolerated header length and response tolerance
- > New function added to LIN Stress Feature Set for configuring the baudrate independently for each response (sent by CANoe)