

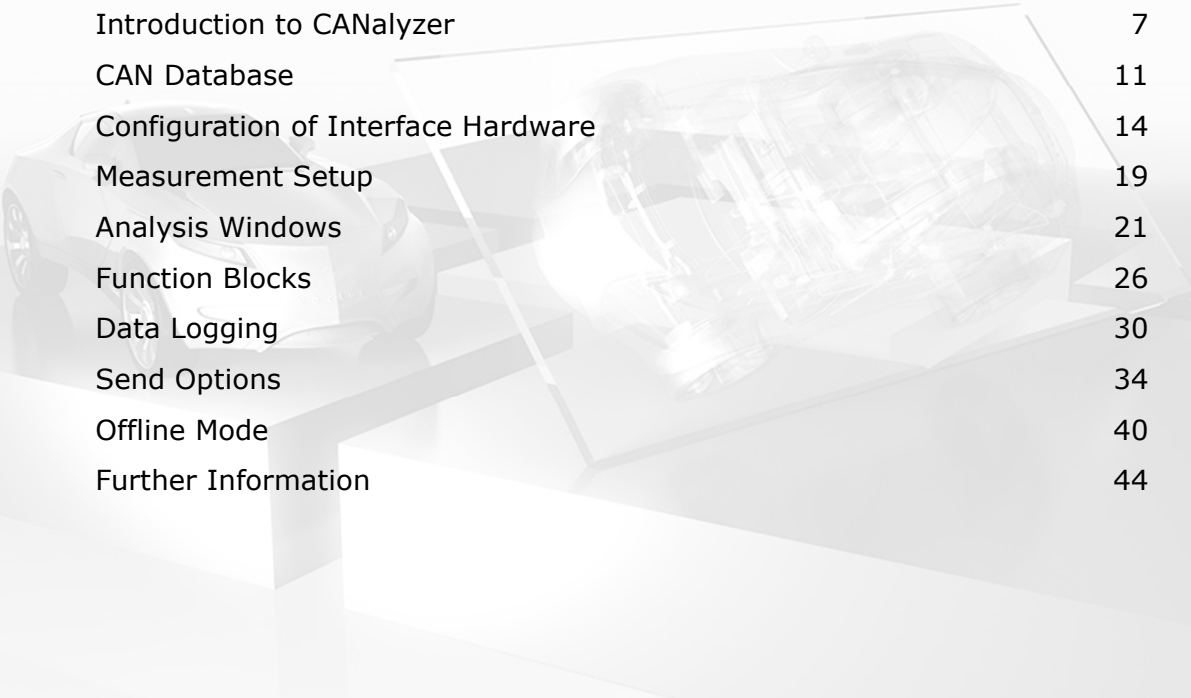
CANalyzer Quickstart

CANalyzer, the tool for comprehensive ECU
and Network Analysis.

V7.6.01 | 2016-06-20

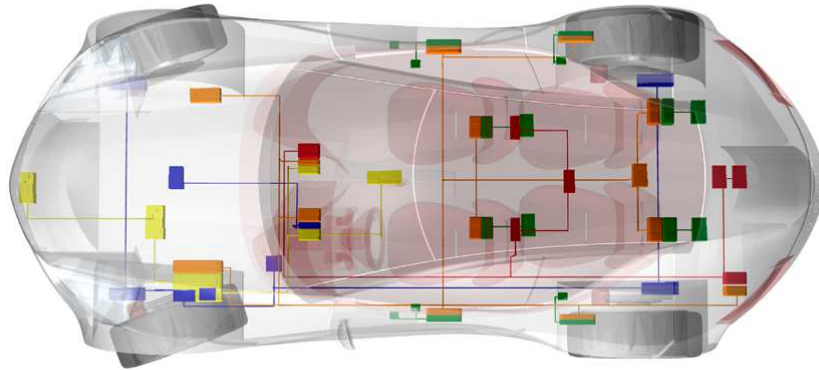
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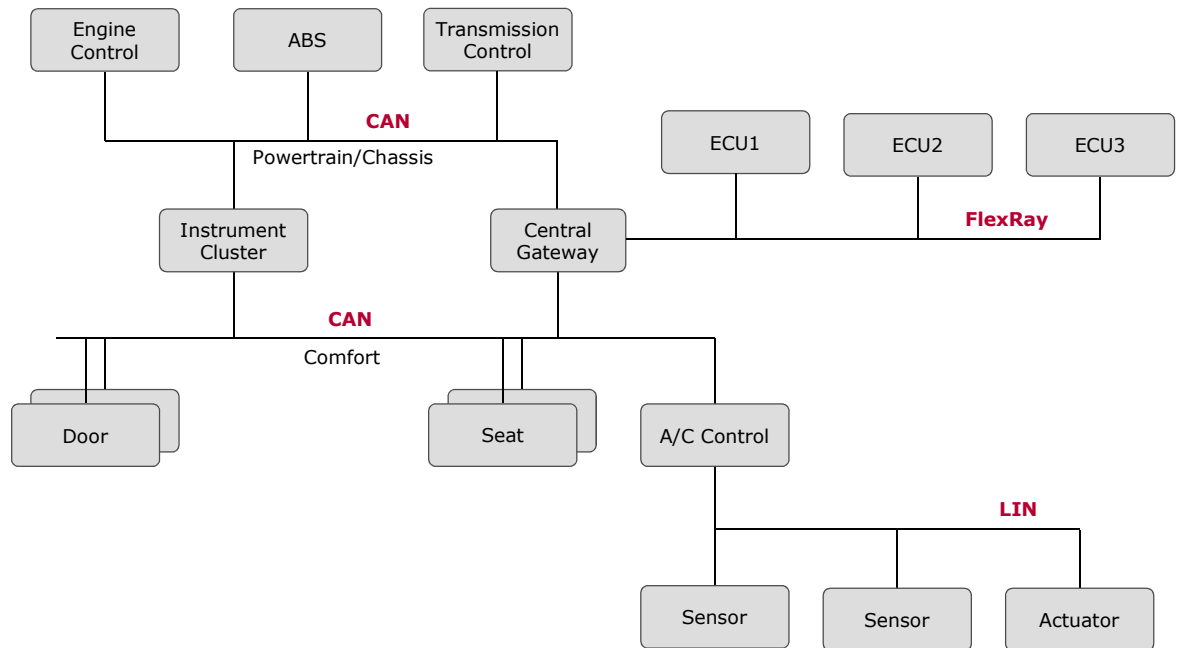


Bus Networking in Vehicles

- ▶ Electronic Control Units (ECU) to control specific tasks in the vehicle
- ▶ ECUs are communicating with each other using a bus system



Example of Networking



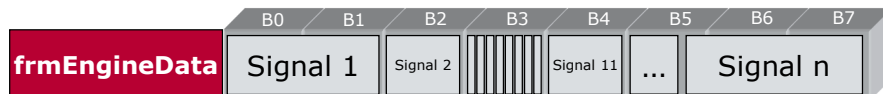
Messages and Signals

CAN Message...

- ▶ ... is the complete package as it is sent over the CAN bus
- ▶ ... is needed to transport useful information over the CAN bus
- ▶ ... has a unique message identifier

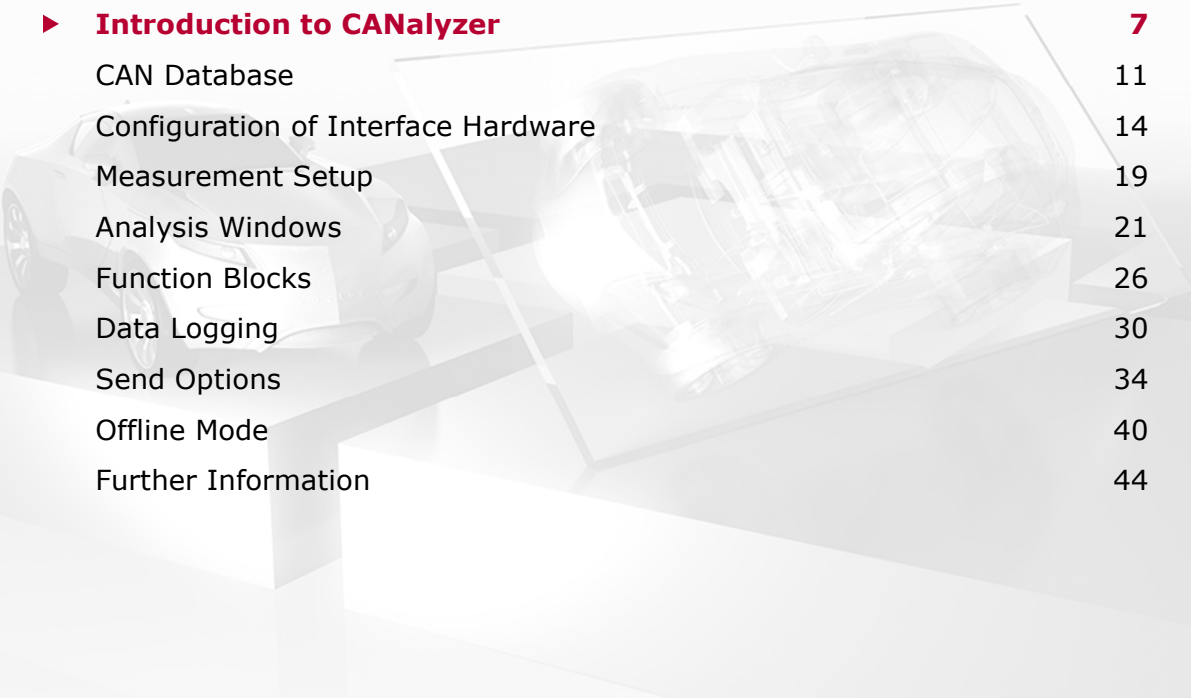
Signals...

- ▶ ... contain the actual useful information
- ▶ ... are defined in the CAN database
- ▶ ... can have a conversion formula and a physical unit

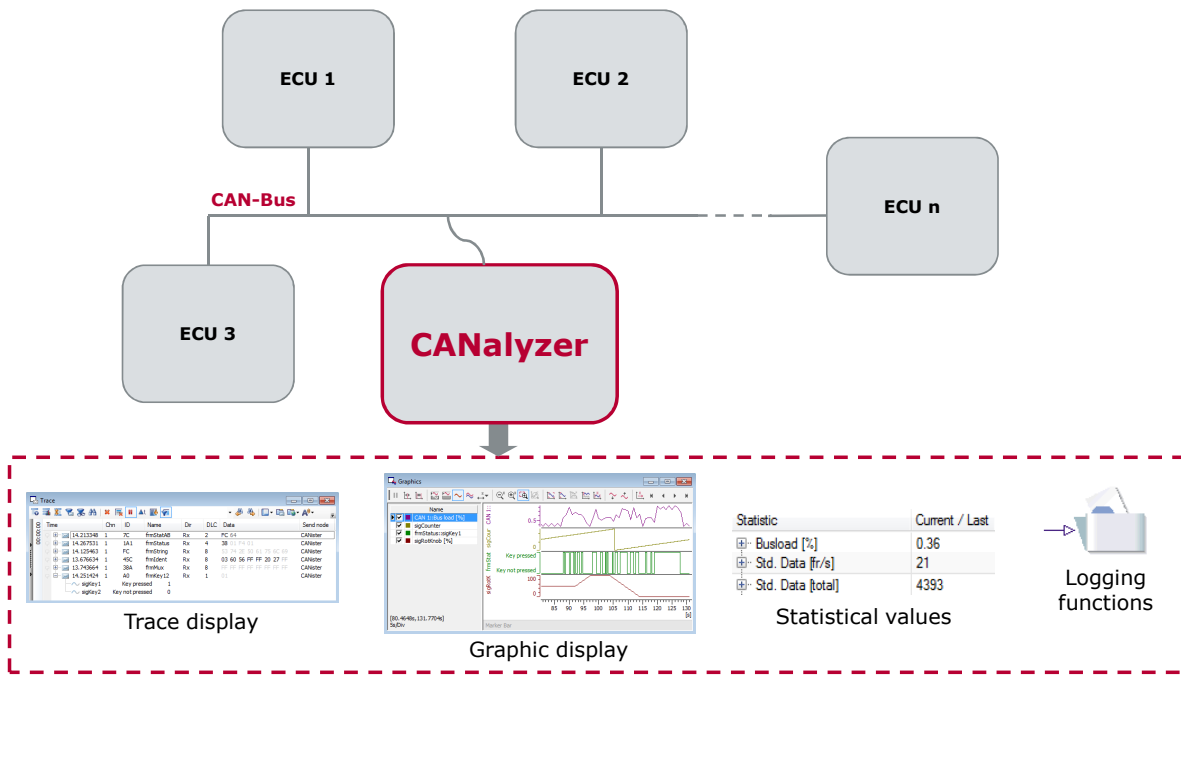


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Typical application area of CANalyzer

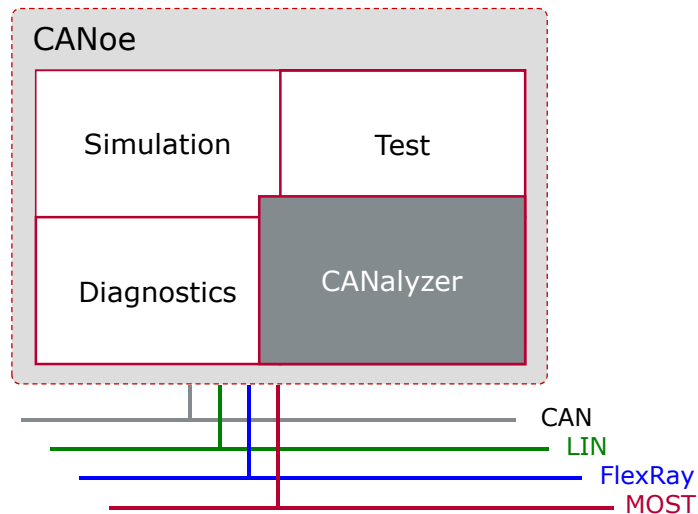


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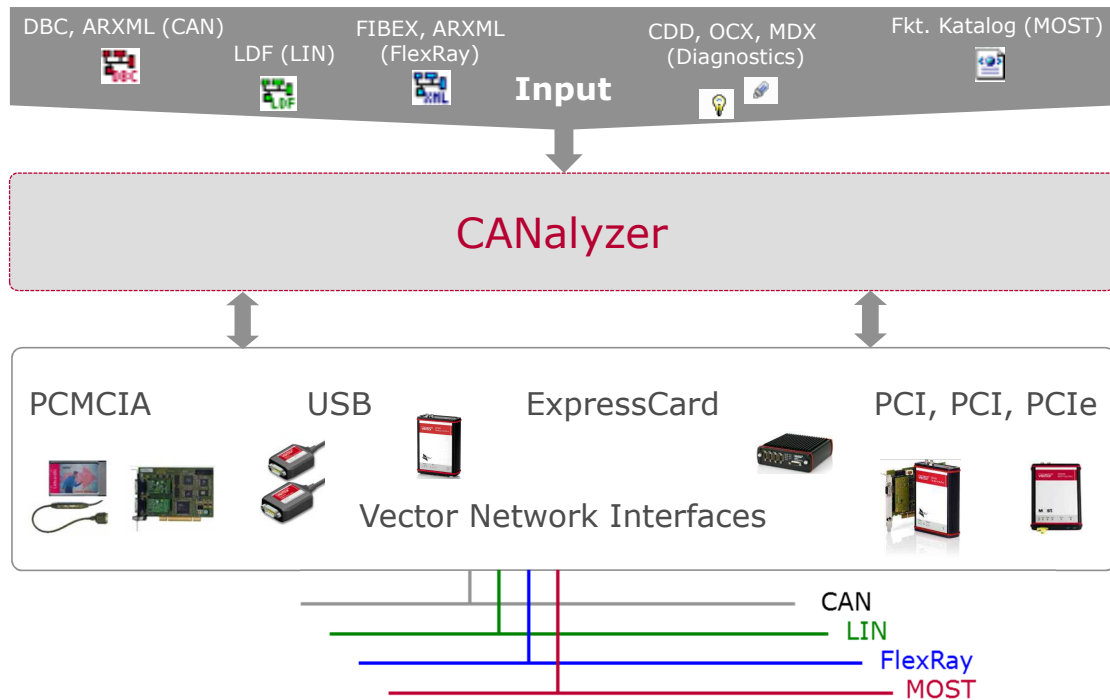
The integrated basic functions cover an abundance of potential uses. These include:

- ▶ Listing of bus data traffic (tracing)
- ▶ Graphic and textual display of signal values
- ▶ Interactively sending out predefined messages
- ▶ Sending out logged messages
- ▶ Statistics on messages
- ▶ Statistics on bus loading and bus faults
- ▶ Logging of messages for offline evaluation
- ▶ Generation of bus faults

CANalyzer and CANoe: what is the difference?



CANalyzer is the collection of CANoe's analysis features with additional features

CANalyzer System

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CANalyzer needs an interface to the CAN bus for its analysis and to send out messages. This interface is available in several variants:

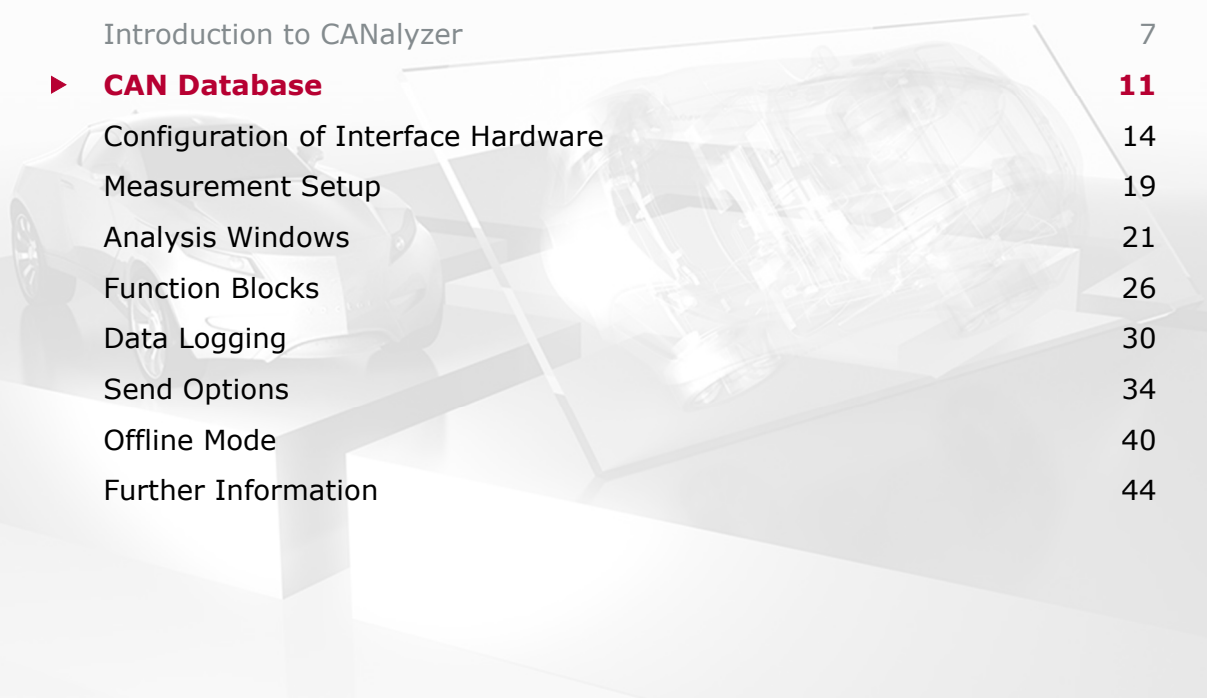
- ▶ PCMCIA
- ▶ USB
- ▶ PCI
- ▶ PXI
- ▶ PCIExpress

Note

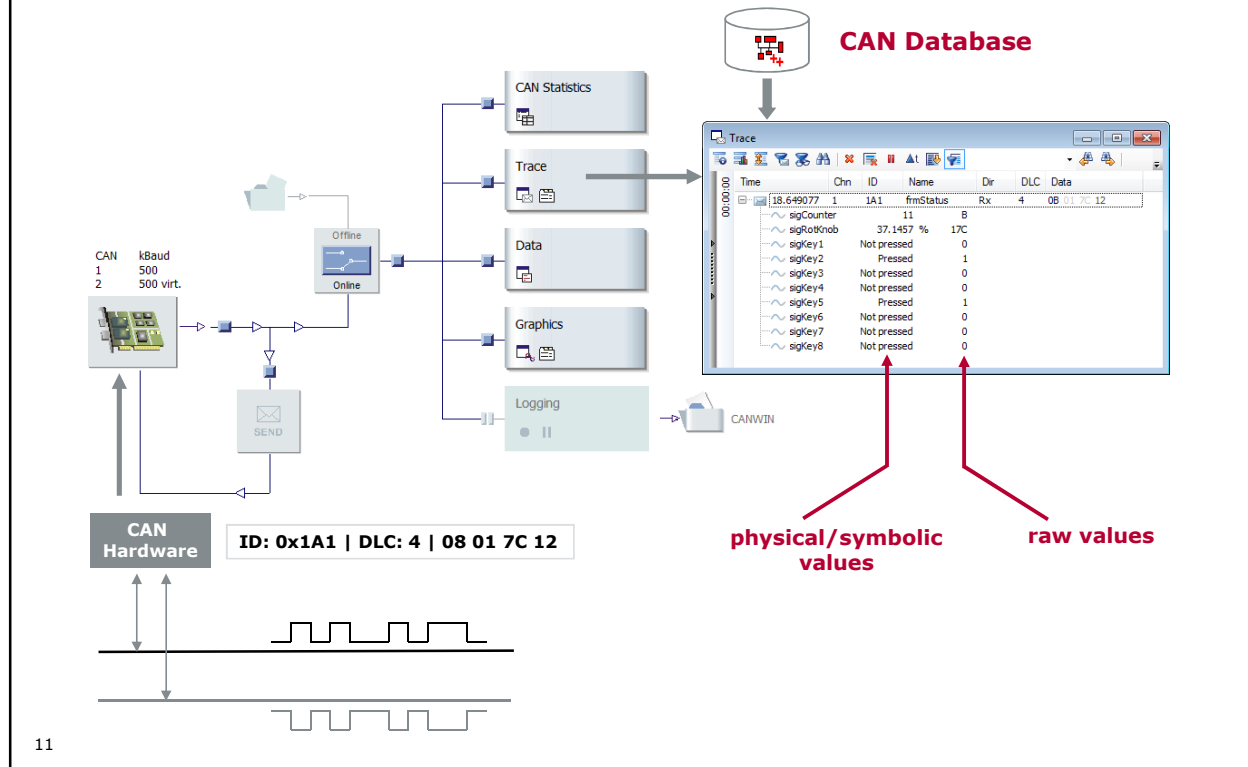
ARXML files conform with the AUTOSAR standard. They can be used and/or modified since CANoe/CANalyzer V7.6

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Effect in Analysis

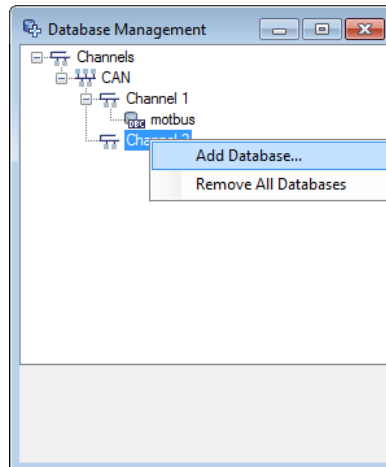


All definitions concerning a CAN bus are determined in a data base. Vector's wide spread DBC format was designed to electronically store such data.

Such a data base can be accessed and used by all of Vector's tools. Above you find an exemplary plot of the data flux in CANalyzer. The mere hex values of a CAN-message are retrieved from the CAN bus by an appropriate hardware interface. The software interprets the data according to the applied data base and displays the results in various analysis windows. Above the Trace Window is shown sizably.

Associate Database

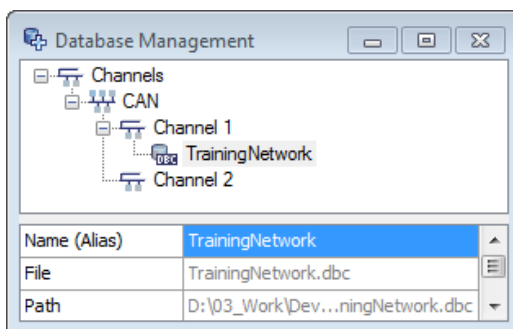
In CANalyzer's *Database Management* window, one or more databases can be assigned to the desired network:



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With *File > Associate Database* you get a menu showing the measurement channels. Choose a channel and use *Add Database* from the right mouse button menu to link one or more data bases. The data bases are processed in the order of the display. This is important to note in case there are distinct frame definitions by synonymous naming contained in more than one data base.

For detailed information mark the database. Additional information is displayed in the grey area below.

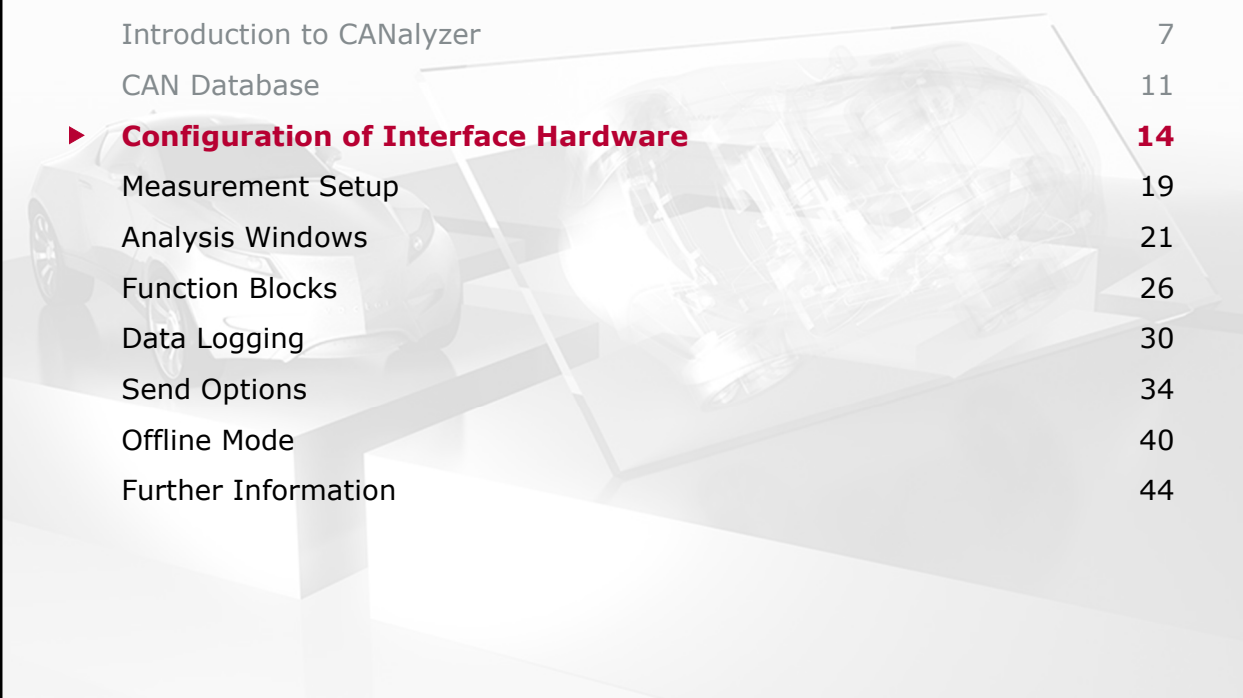


Note:

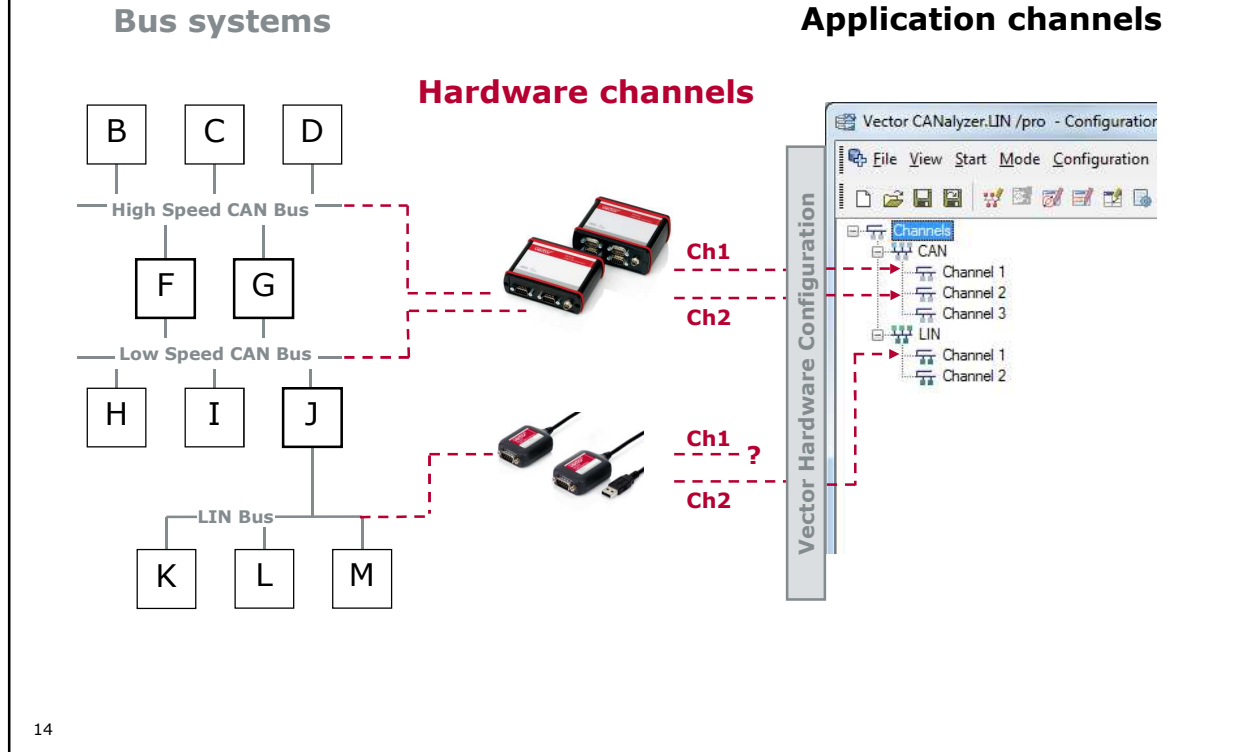
Usually a database describes one network. Nevertheless you can assign more than one database to a channel. Please note, that the content of the used databases should be different. In case of similar content, e.g. a signal, the first assigned database is chosen to interpret the data. The second one will be ignored. The sequence of the databases can be changed by Drag&Drop in the menu above.

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Channels in CANalyzer



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In total, up to 32 channels may be measured simultaneously in CANalyzer. Any combination of buses can be configured as well. A unique identifier is needed to address or read-out (measure) specific channels within CANalyzer. This identifier is formed from the bus name and a sequential number (excerpt):

- ▶ CAN1 to CAN32
- ▶ MOST1 to MOST32
- ▶ LIN 1 to LIN32
- ▶ FlexRay1 to FlexRay32

CANalyzer refers to these internal identifiers as Application Channels! No measurement can be conducted without an Application Channel present (CANalyzer outputs a warning message).

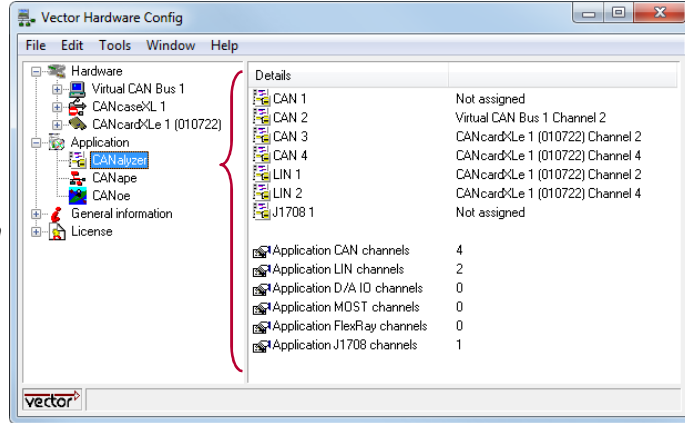
Important!

CANalyzer only displays the Application Channels; CANalyzer does not provide any information about the hardware channel being used. The Hardware Driver Configuration must be opened for that information.

Vector Hardware Configuration

Assignment between Hardware and Application Channels

- ▶ In *Hardware* all Vector Interfaces connected to the system are displayed
- ▶ For every Application (e.g. CANalyzer) the Application Channels can be configured in *Application*
- ▶ *General Information* and *License* contain common and license information

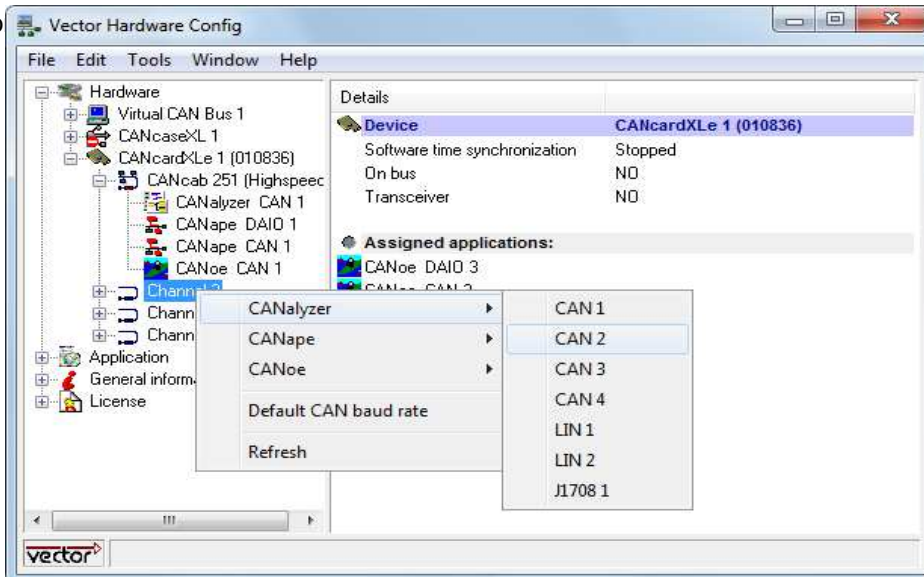


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Serial Numbers of the Interfaces and their transceivers are also displayed in the hardware tree. This is especially useful for interfaces like VN1610 or CANboardXL, since the transceivers or the whole interface are built-in the PC.

Allocation: Hardware Channel Application Channel

An Application (channel) :



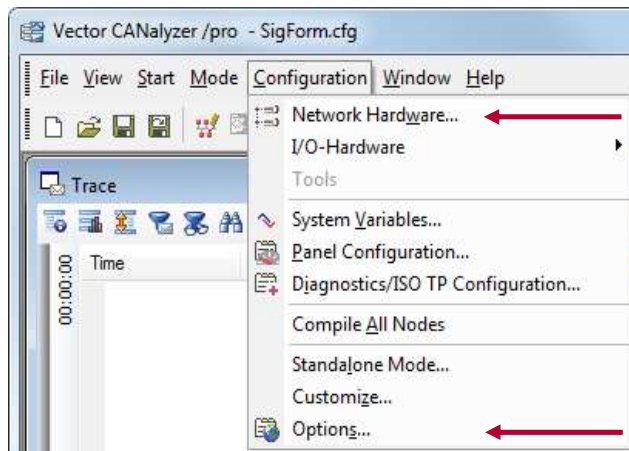
Menu item Configuration

Network Hardware

- ▶ Baud rate
- ▶ Acknowledge
- ▶ Acceptance Filter
- ▶ Drivers

Options

- ▶ Channel Usage
- ▶ Global Settings



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In the menu item Configuration, Global Settings as well as Hardware Settings can be done.

Important Menu Items:

▶ **Network Hardware:**

Here, the controller of the Interface Hardware can be configured for the respective Bus Channel and Type. The settings are done separately for each channel in order to be able to work on different bus systems at a time.

▶ **Customize:**

This menu item opens a window with the registers Commands and Toolbars. Here, the tool bars can be created and adjusted via Drag & Drop.

In order to create a new tool bar, simply drag a key into the main window. There a new tool bar will occur. In order to change an existing tool bar, drag the desired command into the tool bar or out of it. Commands can also be moved from one tool bar to another.

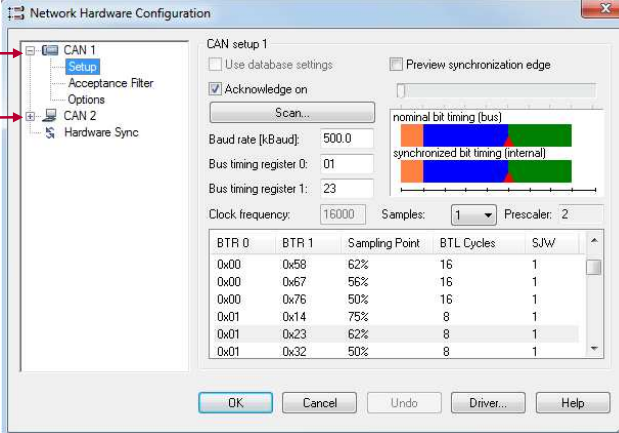
▶ **Options:**

Global settings in CANalyzer can be conducted here, e.g. language (German / English). In the subitem Channel Usage the amount of channels used in the current CANalyzer configuration can be set.

Hardware Configuration for CAN Busses

Each *Hardware Channel* can be configured directly in CANalyzer:

Number of HW Channels,
adjusted in
**Options | Configuration Settings |
Channel Usage**



BTR 0	BTR 1	Sampling Point	BTL Cycles	SJW
0x00	0x58	62%	16	1
0x00	0x67	56%	16	1
0x00	0x76	50%	16	1
0x01	0x14	75%	8	1
0x01	0x23	62%	8	1
0x01	0x32	50%	8	1

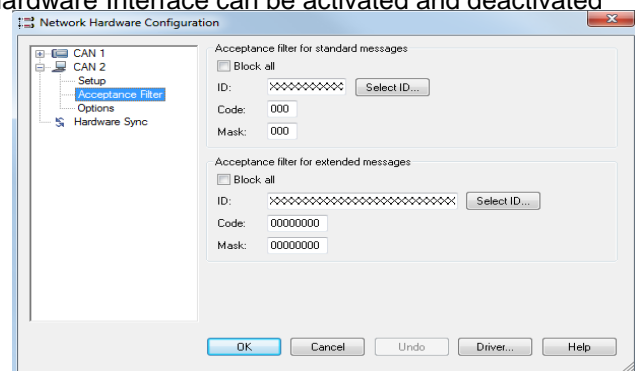
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Setup:

- ▶ Scan... : Automated baud rate detection
- ▶ Baud rate und Bit Timing Register (BTR0 and BTR1) can be configured
- ▶ Graphical display of the CAN Controller Timing resulting of the configured register values (BTR0 and BTR1)
- ▶ Acknowledge by CANalyzer respectively the used Hardware Interface can be activated and deactivated

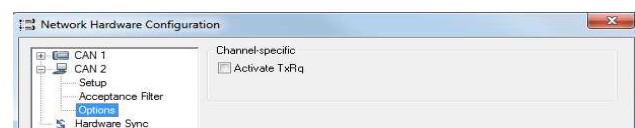
Acceptance Filter:

- ▶ All or several messages can be blocked
- ▶ Filter can also be configured via Code and Mask



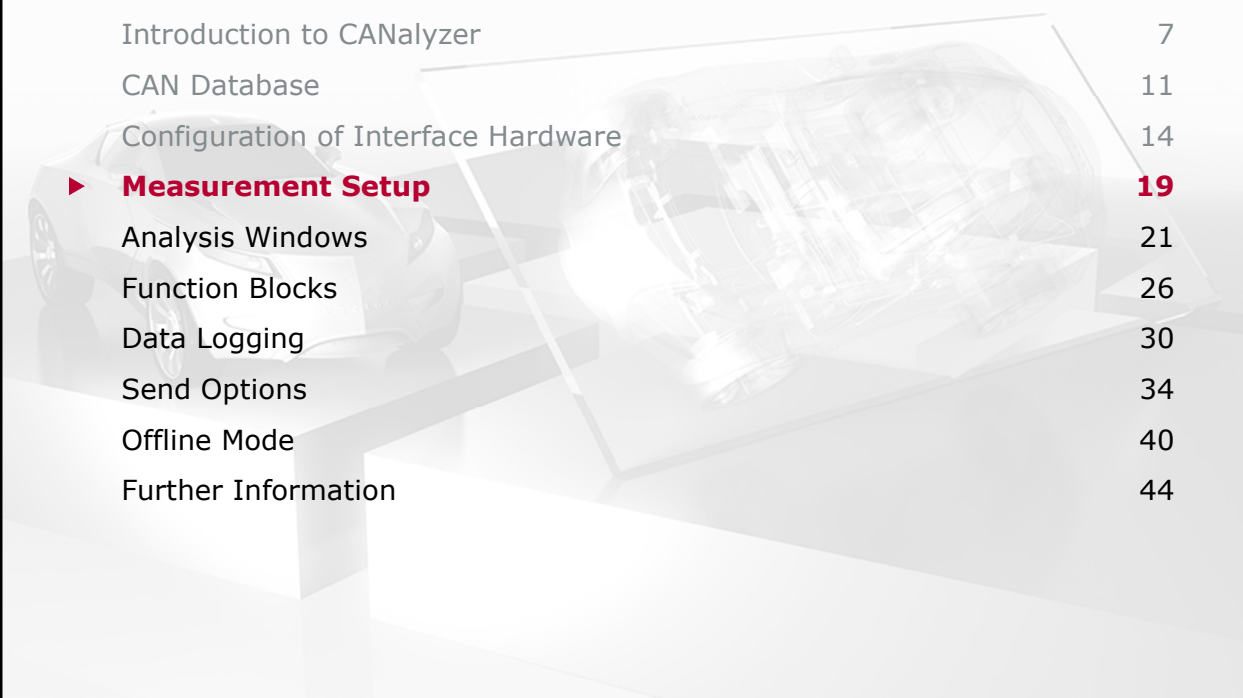
Options:

- ▶ Activate time stamps for send request (are displayed as TxRq messages in CANalyzer)



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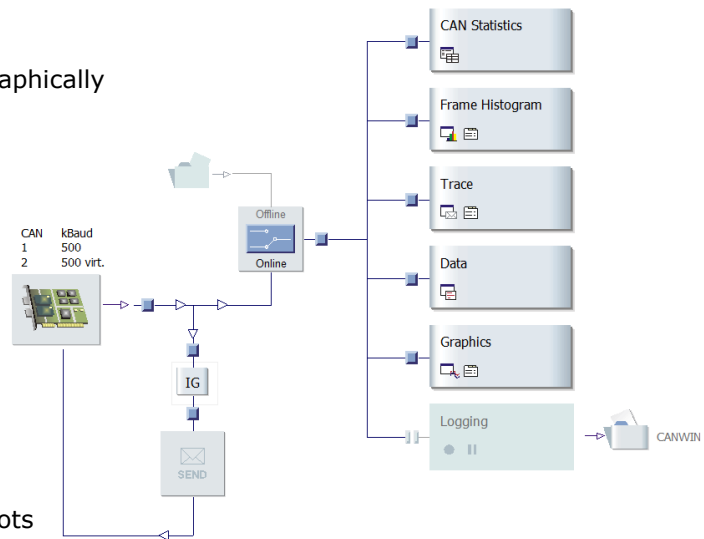
Principle

Measurement Setup

- ▶ Represents the data flow graphically
- ▶ Insertable function blocks
- ▶ Centralized configuration
- ▶ PC card icon as data source
- ▶ Six analysis blocks
- ▶ Sending branch

Simple Configurability

- ▶ Graphical menu with hot spots
- ▶ Context-sensitive popup menus
- ▶ Comprehensive Online Help



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CANalyzer is configured within the measurement setup. In online mode the source of data is the bus hardware interface. It provides the received frames together with their time stamps. Also frames can be sent where the time stamps reflect the point in time they were issued. Depending on the interface used also further information can be obtained, as e.g. the recognition of error frames – including their reason –, the actual busload as well as reception of external trigger signals.

The interface is initialized at measurement start. The necessary parameters need to be set by the user via the menu Configuration → Network Hardware... or by the context menu of the hardware icon in the measurement setup.

To support different busses with different speeds, the user must provide the parameters in question for each bus separately.

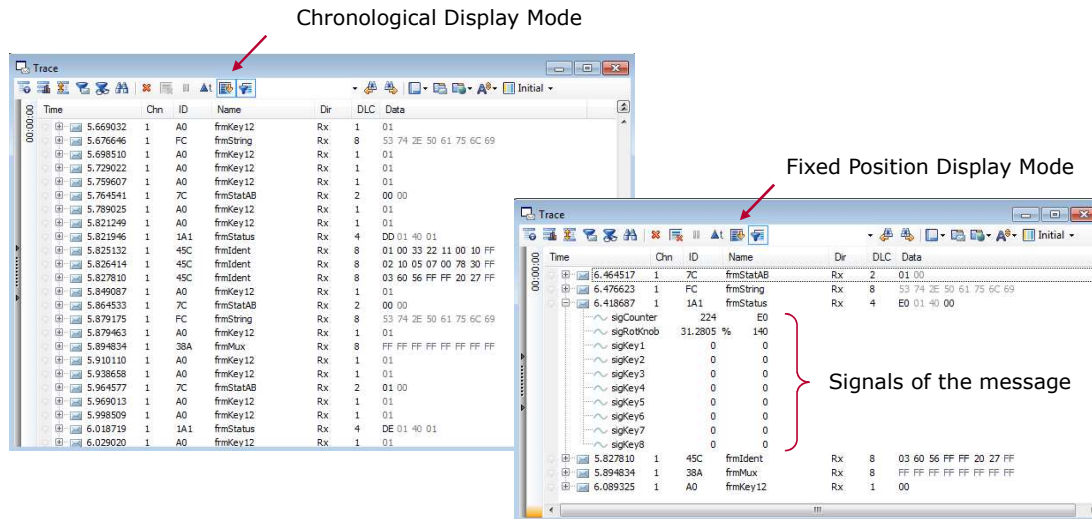
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Trace Window

The *Trace Window* serves to display bus activities during measurement:

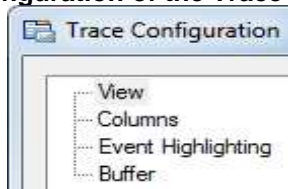


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All messages arriving at the input to the Trace block are evaluated and displayed as a line of information in the Trace Window. The user can choose between two different output modes (see above):

- ▶ *Fixed Position Display Mode*: each message (type) is assigned to a specific line the first time it occurs, and all further messages of the same type are written to the same line
- ▶ *Chronological Display Mode*: each new row is inserted below the previous row. Once the window is full it automatically scrolls upward. This display mode shows the chronological sequence of messages very well. With high bus loads, however, this display mode may cause performance problems since it requires a lot of processing.

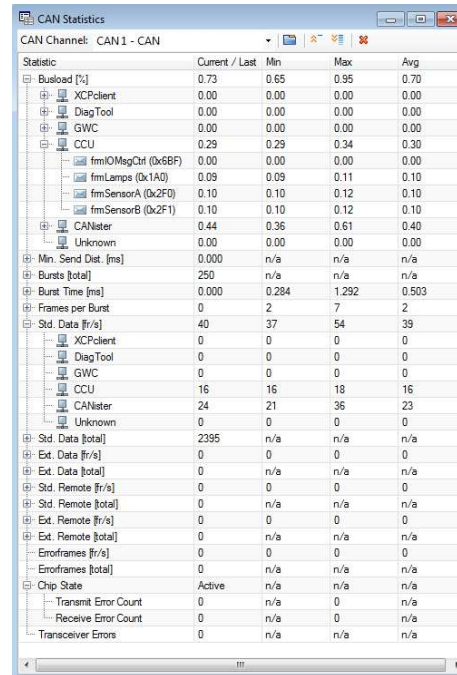
Configuration of the Trace Window:



- ▶ *View*: Configuration of display options
- ▶ *Columns*: Configuration of amount, sorting and inscription of the columns as well as management of the available column layouts
- ▶ *Event Highlighting*: Selection of the default event coloring
- ▶ *Buffer*: Definition of data buffering of each Trace Window

CAN Statistics Monitor

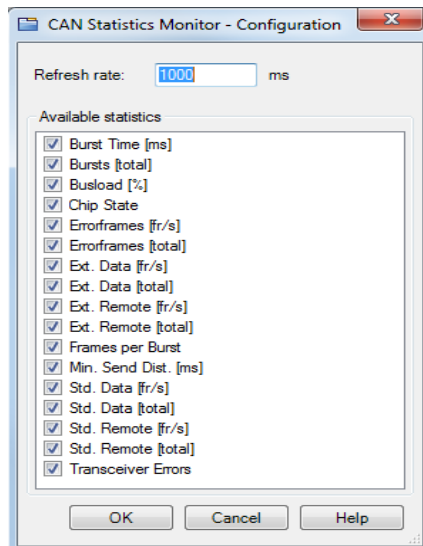
- ▶ Displays statistics about bus activities during measurement
- ▶ Window can be inserted into the measurement setup via the shortcut menu



Statistic	Current / Last	Min	Max	Avg
Busload [%]	0.73	0.65	0.95	0.70
XCPclient	0.00	0.00	0.00	0.00
DiagTool	0.00	0.00	0.00	0.00
GWC	0.00	0.00	0.00	0.00
CCU	0.29	0.29	0.34	0.30
fmiIOMsgCtrl (0x6BF)	0.00	0.00	0.00	0.00
fmiLamps (0x1A0)	0.09	0.09	0.11	0.10
fmiSensorA (0x2F0)	0.10	0.10	0.12	0.10
fmiSensorB (0x2F1)	0.10	0.10	0.12	0.10
CANister	0.44	0.36	0.61	0.40
Unknown	0.00	0.00	0.00	0.00
Min. Send Dist. [ms]	0.000	n/a	n/a	n/a
Bursts [total]	250	n/a	n/a	n/a
Burst Time [ms]	0.000	0.284	1.292	0.503
Frames per Burst	0	2	7	2
Std. Data [fr/s]	40	37	54	39
XCPclient	0	0	0	0
DiagTool	0	0	0	0
GWC	0	0	0	0
CCU	16	16	18	16
CANister	24	21	36	23
Unknown	0	0	0	0
Std. Data [total]	2395	n/a	n/a	n/a
Ext. Data [fr/s]	0	0	0	0
Ext. Data [total]	0	n/a	n/a	n/a
Std. Remote [fr/s]	0	0	0	0
Std. Remote [total]	0	n/a	n/a	n/a
Ext. Remote [fr/s]	0	0	0	0
Ext. Remote [total]	0	n/a	n/a	n/a
Errorframes [fr/s]	0	0	0	0
Errorframes [total]	0	n/a	n/a	n/a
Chip State	Active	n/a	n/a	n/a
Transmit Error Count	0	n/a	0	n/a
Receive Error Count	0	n/a	0	n/a
Transceiver Errors	0	n/a	n/a	n/a

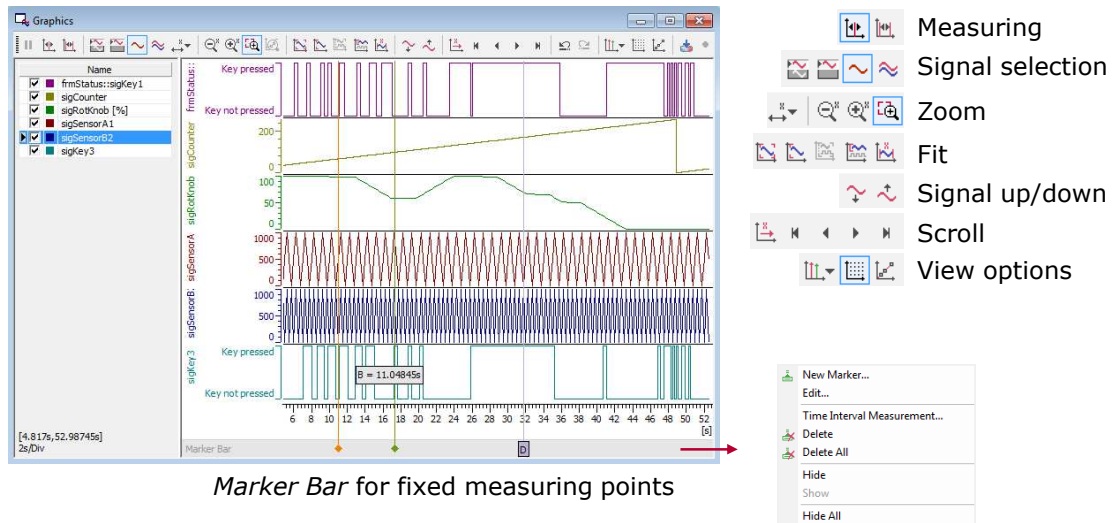
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In the configuration dialog of the CAN Statistics Monitor (shortcut menu) specific statistics can be activated and deactivated:



Graphics Window

The *Graphics Window* serves to display signals in a curve over the time axis:



Marker Bar for fixed measuring points

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In the Graphics Window, time-based signal responses are shown graphically. They are displayed in a X-Y diagram over the time axis. Message signals, environment variables and diagnostic parameters are shown graphically in the form of a curve.

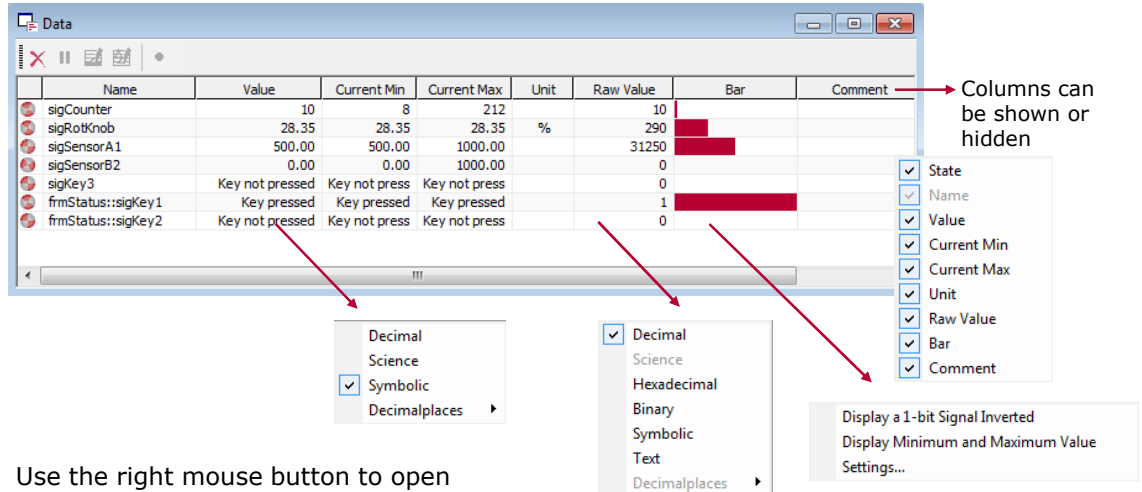
The display of signal curves can be modified with the help of the selectable Y-axis view and with functions for highlighting/hiding signals.

Many functions are available to you for measuring and evaluating the signal curves. You can display the values of specific measurement points using the measurement cursor or difference cursor. The section of signal curves that is displayed can be modified with the help of scaling and scroll functions.

In the legend, measurement columns are provided for displaying values of measurement points according to specific evaluation criteria.

Data Window








The *Data Window* shows the current value of selected signals:



The screenshot shows the Data Window interface with a table of signal data. The table has columns: Name, Value, Current Min, Current Max, Unit, Raw Value, Bar, and Comment. A right-click context menu is open over the table header, showing options to show or hide columns. Another context menu is open over the 'Value' column, showing display mode options: Decimal, Science, Symbolic, and Decimalplaces. A third context menu is open over the 'Bar' column, showing options: Display a 1-bit Signal Inverted, Display Minimum and Maximum Value, and Settings...

Columns can be shown or hidden

Use the right mouse button to open one of the several context menus.

Name	Value	Current Min	Current Max	Unit	Raw Value	Bar	Comment
sigCounter	10	8	212		10		
sigRotKnob	28.35	28.35	28.35	%	290		
sigSensorA1	500.00	500.00	1000.00		31250		
sigSensorB2	0.00	0.00	1000.00		0		
sigKey3	Key not pressed	Key not press	Key not press		0		
frmStatus::sigKey1	Key pressed	Key pressed	Key pressed		1		
frmStatus::sigKey2	Key not pressed	Key not press	Key not press		0		

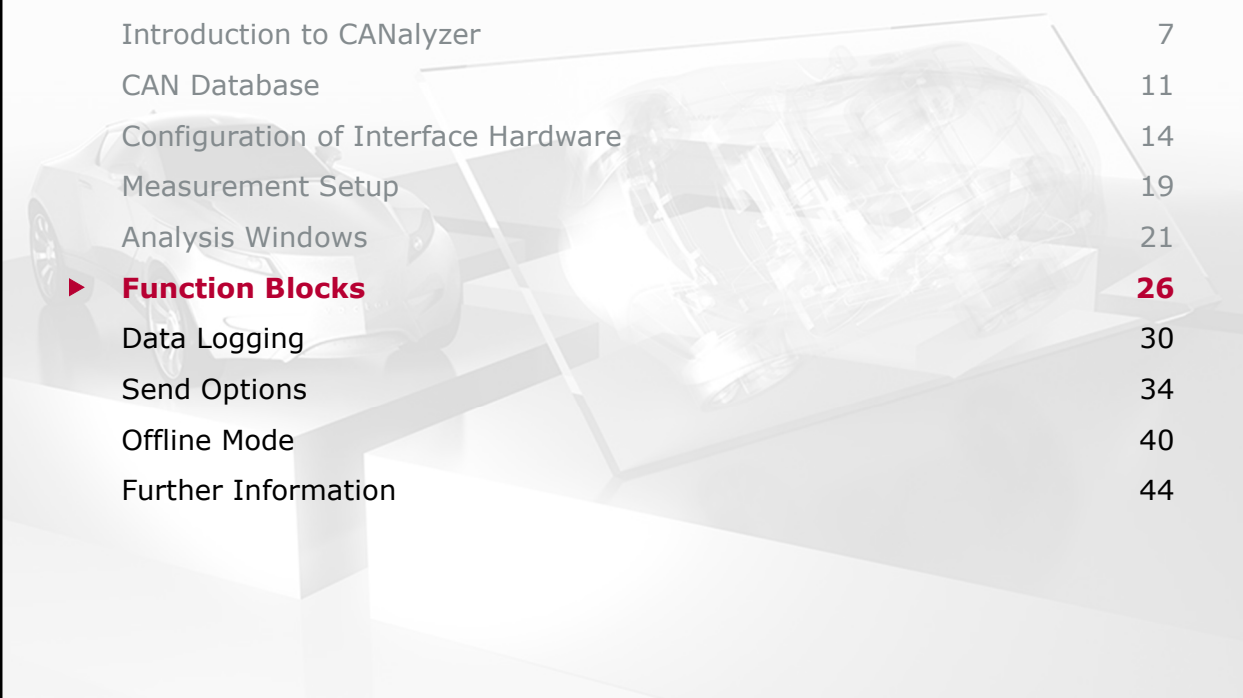
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The display of columns can be configured by right clicking their segment in the table header line. By default signal name, physical value, unit, raw value and progress bar are displayed. Furthermore there are the following columns:


- ▶ **Status** (far left) This column contains the activity display which cannot be removed.
- ▶ **Name** You can configure the display mode of the signal's name:
 - > signal name
 - > signal name plus message name
 - > signal name plus message name plus data base name
- ▶ **Value** The physical value is retrieved from the raw value by applying the linear formula from the data base. The display mode of the value is configurable (decimal digits, scientific, symbolic).
- ▶ **Min** The minimal value of the signal throughout the measurement.
- ▶ **Max** The maximal value of the signal throughout the measurement.
- ▶ **Unit** If the data base contains information concerning a unit, it is displayed here.
- ▶ **Raw Value** The display mode of the value is configurable (decimal, hexadecimal, binary, symbolic).
- ▶ **Bar** A configurable bar diagram is displayed.
- ▶ **Comment** If the data base contains commentary information it is displayed here.

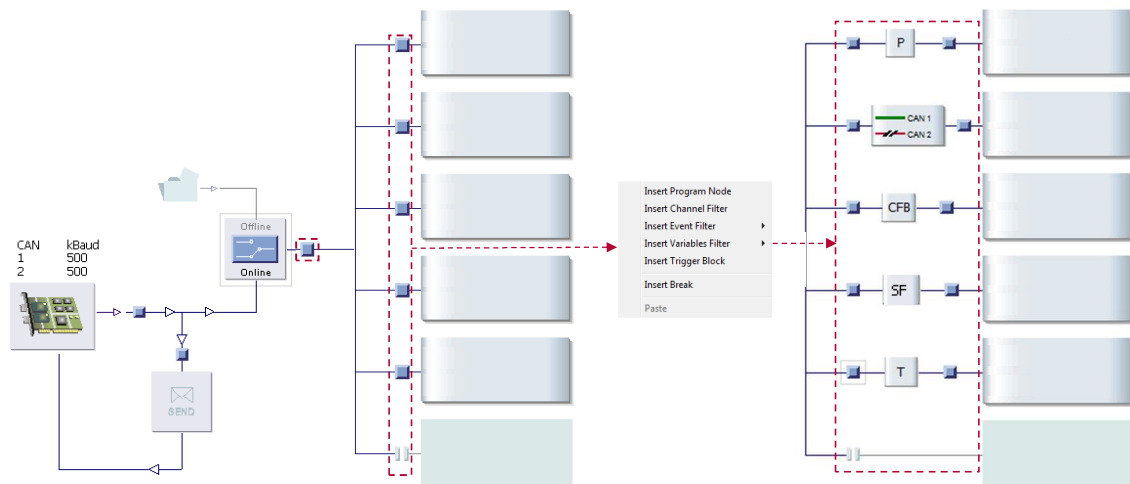
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Overview

- ▶ Function blocks can manipulate the data flow in the measurement setup
- ▶ By right clicking the hot spots  , function blocks can be inserted



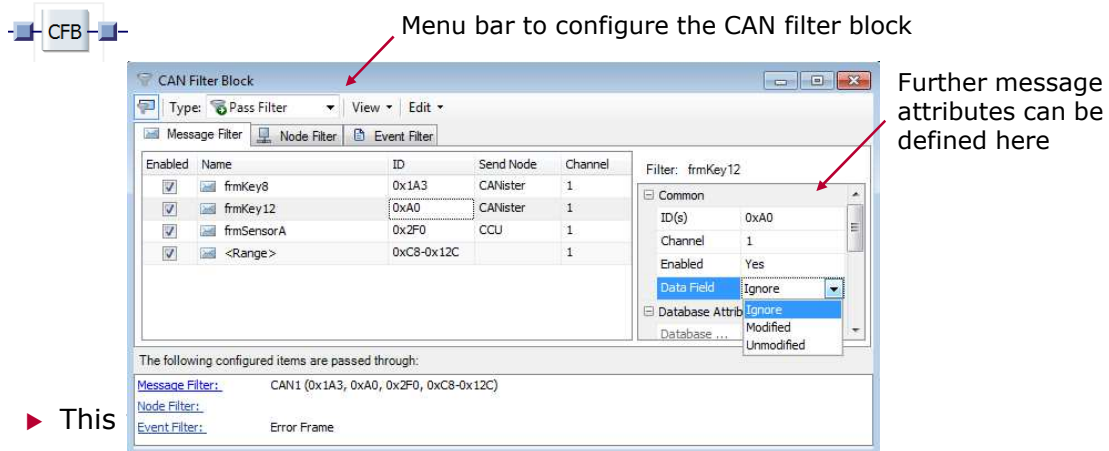
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In the data flux diagram there are little squared blocks, the so called hot spots. By right clicking those hot spots function blocks can be inserted. Alternatively you may select a hot spot via the cursor keys and then press <F10>. If a hot spot is double clicked it turns grey and its shape is split. This indicates that the data flux is stopped at this point.

An arbitrary number of function blocks can be inserted at each hot spot.

Event Filter in the Measurement Setup

- ▶ Intentional reduction of the data volume
- ▶ Filter individual messages or network nodes



▶ This

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The *CAN Filter Block* window is separated into three areas:

- ▶ **Menu bar**
The *CAN Filter Block* is configured here: active/inactive, pass or stop filter, design and events.

- ▶ **Filter view**
Messages, network nodes, events

Enabled	Name	ID	Send Node	Channel
<input checked="" type="checkbox"/>	frmKey8	0x1A3	CANister	1
<input checked="" type="checkbox"/>	frmKey12	0xA0	CANister	1
<input checked="" type="checkbox"/>	frmSensorA	0x2F0	CCU	1
<input checked="" type="checkbox"/>	<Range>	0xC8-0x12C		1

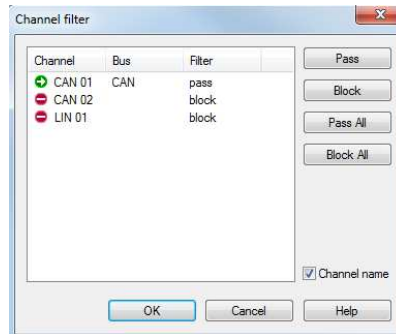
- ▶ The following configured items are passed through:
Message Filter: CAN1 (0x1A3, 0xA0, 0x2F0, 0xC8-0x12C)
Node Filter:
Event Filter: Error Frame
 played.

There are two kinds of filters:

- ▶ **Pass filter:** all configured events are passed thru
- ▶ **Stop filter:** all configured events are blocked
- ▶ **Note:** Consistent with its meaning, a pass filter that is not configured (empty), does not allow any messages to pass, and it thereby blocks all message traffic.

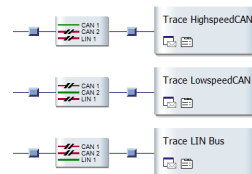
Channel Filter in the Measurement Setup

A channel filter can be used to completely block or pass the channels of all registered bus systems (CAN, LIN, MOST or FlexRay).



Example:

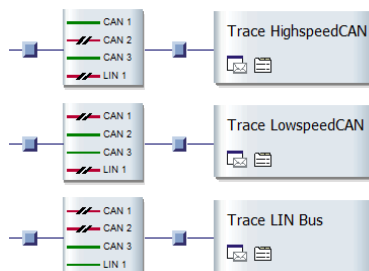
- ▶ Adding bus system specific analysis windows to the Measurement Setup



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If another bus is added to the CANalyzer configuration, the number of channels in the Channel filter is updated automatically.

Note: The behavior of the Channel Filter has to be adjusted respectively. Newly added channels are open by default.



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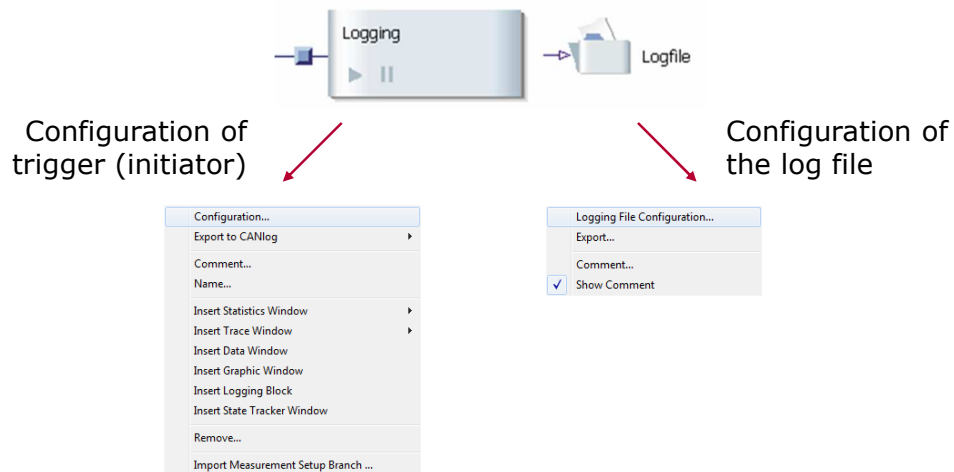


Data formats

- ▶ ASCII (***.asc**) used primarily to exchange data with external programs; for all bus systems
- ▶ Binary (***.blf**) supports all bus systems and protocols, as well as environmental variables
- ▶ Signal oriented format (***.mdf**) supports the logging of signals; these files can be imported into the Graphics Window (for all bus systems)
- ▶ Message AND signal oriented format (***.mf4**) supports the logging of message and signal data; commonly used with calibration toolsets such as CANape

Logging Block

The *Logging Window* is used to log the real and/or the simulated message traffic.



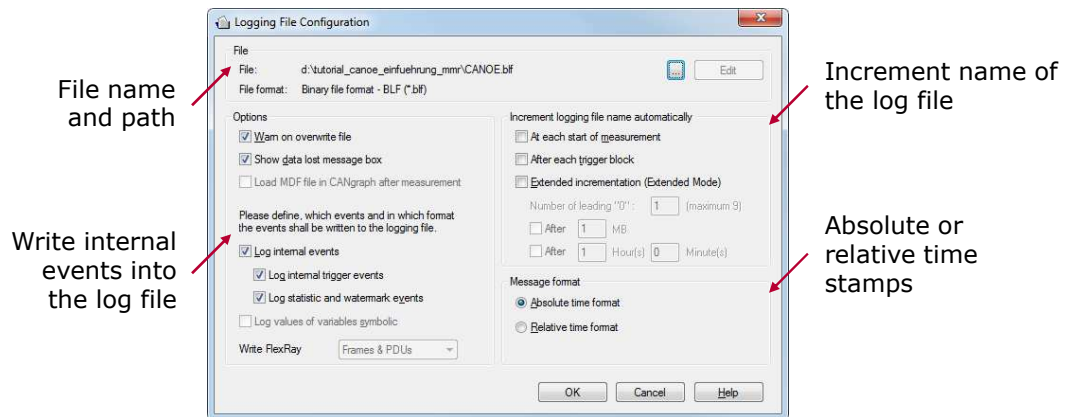
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Logging is configured by two settings:

- ▶ Configuration of the log file (name, path, etc.)
- ▶ Configuration of triggering (which conditions should be used to start or stop logging)

Configuration of the Logging File

In the configuration of the *Logging File* further settings, such as path, file name and file format can be conducted:




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- ▶ Decimal or hexadecimal representation is selected using the global Hex/Dec switch.
- ▶ The setting that indicates whether a message's symbolic name or its ID is written, is selected by the global Numeric/Symbolic switch.
- ▶ The user can also specify whether a warning should appear before overwriting an existing measurement file at the start of a measurement.
- ▶ In logging, you define whether or not you wish to have internal program events logged also, and if so which internal program events. Internal events include trigger events, CANalyzer status messages and bus statistics information.
- ▶ The data lost message box lets you specify whether you should be notified if there are data losses. Faulty lines in the log file are marked by the special character '*'.

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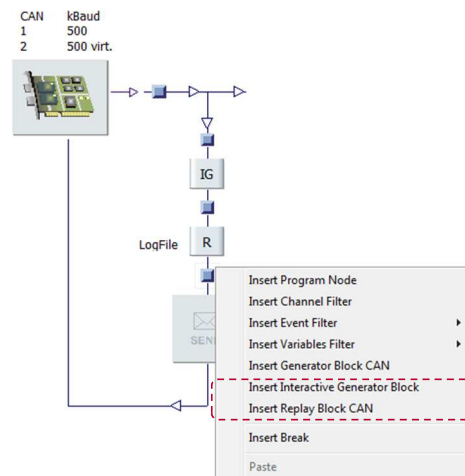


Overview

- ▶ *Interactive Generator Block*: fast, improvisational sending of single messages
- ▶ *Replay Block*: simple reproduction of measurement sequences, either of one, several or all network nodes

Hint:

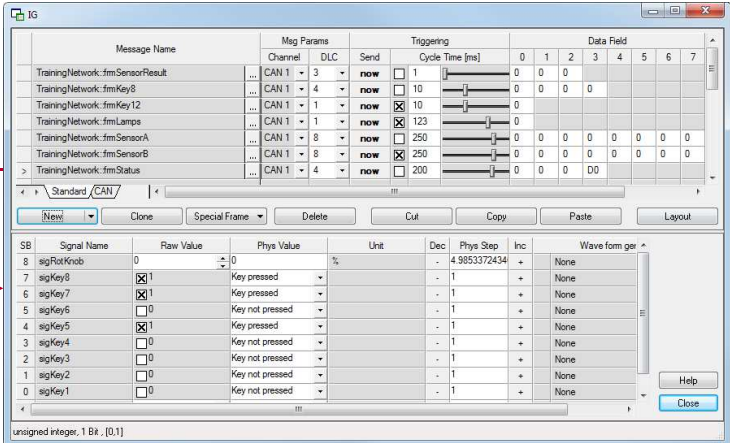
Sending messages can only be done in the sending branch of the measurement setup



Interactive Generator

Using the *Interactive Generator* messages and their signals can be configured before or during the measurement.

Triggering (spontaneous or periodic)



Signals of the selected message are shown in the signal list

Message Name	Channel	DLC	Send	Triggering	Data Field
				Cycle Time [ms]	0 1 2 3 4 5 6 7
TrainingNetwork: frmSensorResult	CAN 1	3	now	1	0 0 0
TrainingNetwork: frmKey8	CAN 1	4	now	10	0 0 0 0
TrainingNetwork: frmKey12	CAN 1	1	now	10	0
TrainingNetwork: frmLamps	CAN 1	1	now	123	0
TrainingNetwork: frmSensorA	CAN 1	8	now	250	0 0 0 0 0 0 0 0
TrainingNetwork: frmSensorB	CAN 1	8	now	250	0 0 0 0 0 0 0 0
TrainingNetwork: frmStatus	CAN 1	4	now	200	0 0 0 0 0 0

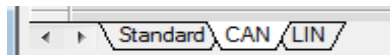
SB	Signal Name	Raw Value	Phys Value	Unit	Dec	Phys Step	Inc	Wave form gen
8	sigRotKnob	0	0	%	-	4.9853372434	+	None
7	sigKey8	1	Key pressed		-	1	+	None
6	sigKey7	1	Key pressed		-	1	+	None
5	sigKey6	0	Key not pressed		-	1	+	None
4	sigKey5	1	Key pressed		-	1	+	None
3	sigKey4	0	Key not pressed		-	1	+	None
2	sigKey3	0	Key not pressed		-	1	+	None
1	sigKey2	0	Key not pressed		-	1	+	None
0	sigKey1	0	Key not pressed		-	1	+	None

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The Interactive Generator Block (IG) is used to generate and send messages. For this purpose, a list of messages with trigger condition is input in a configuration dialog. A signal list is assigned to each message, in which the signal values can be set. The signal lists are taken from an associated database.

Characteristic for the Interactive Generator Block is the possibility to configure and interactively send messages during a running measurement (online). This makes the IG especially well-suited for quick, improvised actions to affect a measurement.

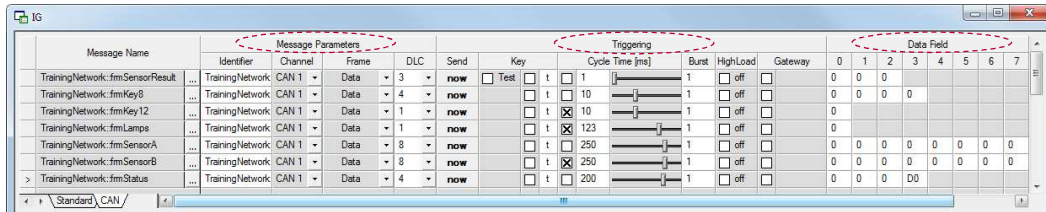
Depending on the activated bus systems



available within the IG:

Interactive Generator – Transmit list

- ▶ Depending on the chosen view, different fields are available in the transmit list of the *Interactive Generator*



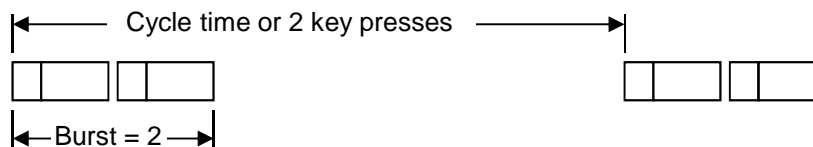
Message Name	Message Parameters				Send	Key	Triggering				Data Field								
	Identifier	Channel	Frame	DLC			Cycle Time [ms]	Burst	HighLoad	Gateway	0	1	2	3	4	5	6	7	
TrainingNetwork:fmSensorResult	TrainingNetwork	CAN 1	Data	3	now	<input type="checkbox"/> Test	<input type="checkbox"/> t	<input type="checkbox"/> 1	<input type="checkbox"/> 10	1	<input type="checkbox"/> off	<input type="checkbox"/>	0	0	0				
TrainingNetwork:fmKey8	TrainingNetwork	CAN 1	Data	4	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input type="checkbox"/> 10	<input type="checkbox"/> 10	1	<input type="checkbox"/> off	<input type="checkbox"/>	0	0	0	0			
TrainingNetwork:fmKey12	TrainingNetwork	CAN 1	Data	1	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 10	1	<input type="checkbox"/> off	<input type="checkbox"/>	0						
TrainingNetwork:fmLamps	TrainingNetwork	CAN 1	Data	1	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input checked="" type="checkbox"/> 123	<input type="checkbox"/> 123	1	<input type="checkbox"/> off	<input type="checkbox"/>	0						
TrainingNetwork:fmSensorA	TrainingNetwork	CAN 1	Data	8	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input type="checkbox"/> 250	<input type="checkbox"/> 250	1	<input type="checkbox"/> off	<input type="checkbox"/>	0	0	0	0	0	0	0
TrainingNetwork:fmSensorB	TrainingNetwork	CAN 1	Data	8	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input checked="" type="checkbox"/> 250	<input type="checkbox"/> 250	1	<input type="checkbox"/> off	<input type="checkbox"/>	0	0	0	0	0	0	0
TrainingNetwork:fmStatus	TrainingNetwork	CAN 1	Data	4	now	<input type="checkbox"/>	<input type="checkbox"/> t	<input type="checkbox"/> 200	<input type="checkbox"/> 200	1	<input type="checkbox"/> off	<input type="checkbox"/>	0	0	0	0	0	0	0

- ▶ For each message, parameters such as ID, channel or DLC, can be configured
- ▶ With trigger conditions (Triggering) it is specified at which point in time a message should be sent
- ▶ The content of the message can be changed in the Data Field directly, or in the Signal list of the message

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Burst

A burst indicates the number of messages to be sent per triggering. The default value for burst is set to 1, i.e. exactly one message is sent per triggering.



High Load

A bus high load is reached when messages are sent immediately after one another on the bus. For this purpose, right after a message has been sent successfully, this must be followed up by the next send request for the same message. The number set in the Burst parameter indicates the constant number of messages in the send queue. In this triggering condition, you should not simultaneously send the same message by send command, key or cycle time, since that would cause the queue to overrun, and a data loss could occur.

Gateway

The IG can be used as a gateway. Either individual messages or all bus communication can be transmitted from one bus to another. Signal values can also be modified in transmission.

Interactive Generator – Signal list

- ▶ Signal values of the message are changed in the IG's *Signal list*

SB	Signal Name	Raw Value	Phys Value	Unit	Dec	Phys Step	Inc	Wave form generation	
8	sigRotKnob	0	0	%	-	4.9853372434	+	None	Define...
7	sigKey8	<input checked="" type="checkbox"/> 1	Key pressed		-	1	+	None	Define...
6	sigKey7	<input checked="" type="checkbox"/> 1	Key pressed		-	1	+	None	Define...
5	sigKey6	<input type="checkbox"/> 0	Key not pressed		-	1	+	None	Define...
4	sigKey5	<input checked="" type="checkbox"/> 1	Key pressed		-	1	+	None	Define...
3	sigKey4	<input type="checkbox"/> 0	Key not pressed		-	1	+	None	Define...
2	sigKey3	<input type="checkbox"/> 0	Key not pressed		-	1	+	None	Define...
1	sigKey2	<input type="checkbox"/> 0	Key not pressed		-	1	+	None	Define...
0	sigKey1	<input type="checkbox"/> 0	Key not pressed		-	1	+	None	Define...
24	sigCounter	0	0		-	13	+	None	Define...

Default input mode: CAN

- ▶ If a value table is assigned to a signal in the data base, the IG allows direct access to the *symbolic values* of the signal

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- ▶ The possible value ranges that can be set are given in the status line :

SB	Signal Name	Raw Value	Phys Value	Unit	Dec	Phys Step	Inc	Wave form generation	
8	sigRotKnob	1FA	49.46236559143	%	-	4.9853372434	+	<input checked="" type="checkbox"/>	Ramps and pulses
7	sigKey8	<input checked="" type="checkbox"/> 1	Key pressed		-	1	+		None
6	sigKey7	<input checked="" type="checkbox"/> 1	Key pressed		-	1	+		None

unsigned integer, 10 Bits, [0..3FF]

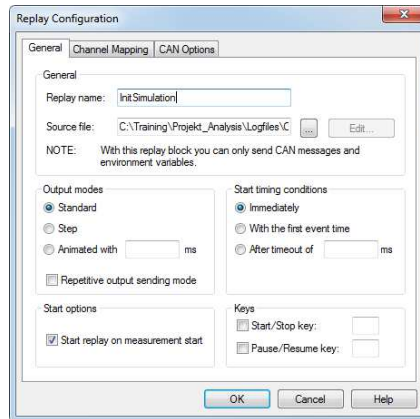
- ▶ If intermediate values cannot be represented as raw values when physical signal values are entered, the program automatically rounds up or down to the nearest value.
- ▶ Depending on the signal type, raw and physical values may vary between signals. The following signal types are available:
 - ▶ Enumeration (Enum): Symbolic selection of defined value descriptions in the input field (taken from the database)
 - ▶ Bit signal: Option button enables convenient toggling (Not activated = 0, activated = 1)
 - ▶ Multiplexor signal: In signal multiplexing different signals are transmitted in one message, wherein the specific signal depends on the multiplex value. The signal containing the multiplex value is referred to as the multiplexor signal. The signals that are transmitted as a function of the multiplex value are referred to as multiplexed signals. The multiplexed signals are automatically updated whenever the multiplex value is changed.

Replay Block

The *Replay Block* offers the capability of playing back measurement sequences that have already been logged. To do this, the user specifies a log file. The messages it contains are introduced into the data flow.

Send mode:

- ▶ Standard
- ▶ Stepwise (next step by CAPL or key)
- ▶ Ignore original times and use this cycle



Supported formats:

- ▶ ASCII (*.asc)
- ▶ Binary format (*.log)
- ▶ Binary format (*.blf)

Start time behavior:

- ▶ Immediately (1st message on start)
- ▶ Send times as in File
- ▶ Delayed by this time

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The Replay Block can be used to send logged messages back onto the bus from a file (recorded in logging). The Replay Block must be inserted in the send branch of CANalyzer's Measurement Setup.

The log file to be sent out, the send mode and time conditions at the start are selected in the configuration menu of the Replay Block. The start option can be defined with or without keys. In addition, the user may specify whether RX, TX or both types of messages should be sent. Moreover, the user can specify the CAN controller to be used to send a message that originates from a specific CAN controller.

The file may be sent once or repeatedly. In the case of repeated sending, when the end of the file is reached sending begins again with the first message of the log file.

Start timing conditions defines when the first message of the file should be sent. There are three possibilities:

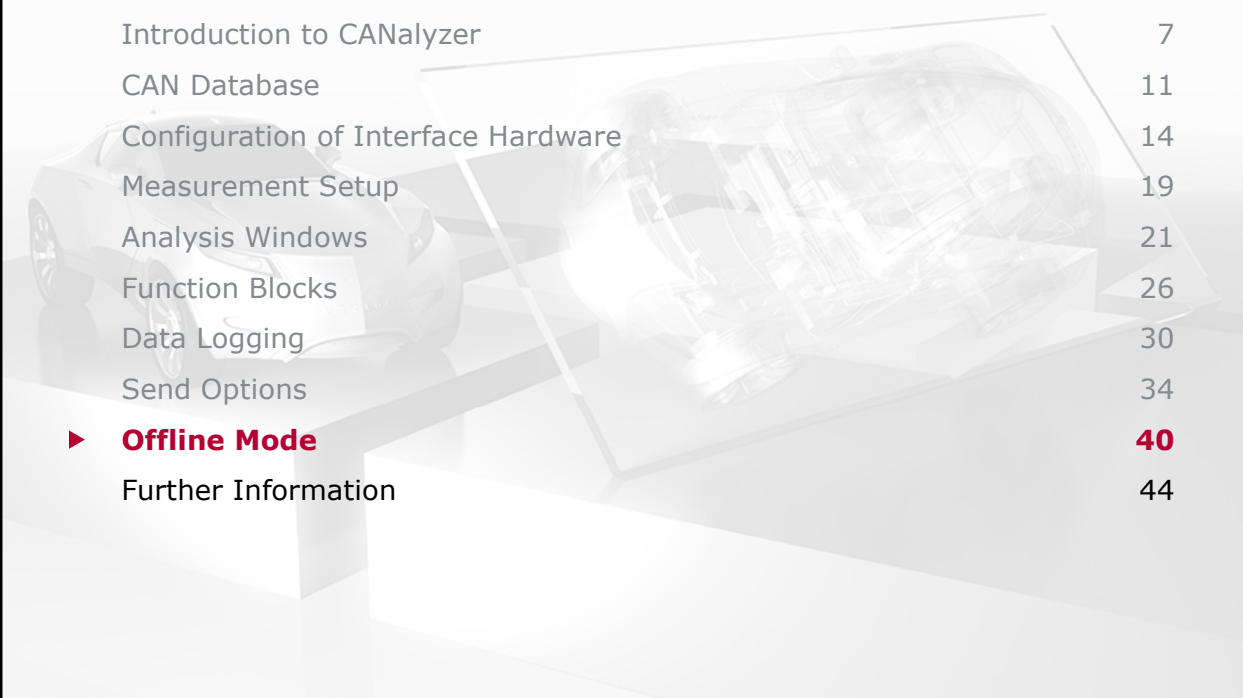
- ▶ Immediate: The first message is sent at the measurement start.
- ▶ As in original: The send times match the original times contained in the file.
- ▶ Delayed by: In the input box under this, the user enters the send time of the first message relative to the measurement start.

In all three cases, the relative time spacing between messages is preserved.

Step can be used to index the time flow by CAPL functions; otherwise a fixed time cycle can be specified using Animated with.

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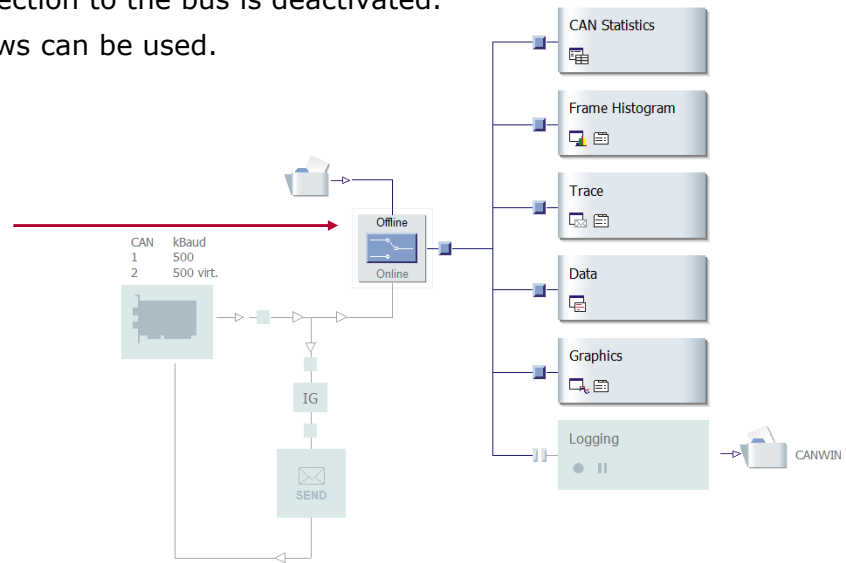
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Overview

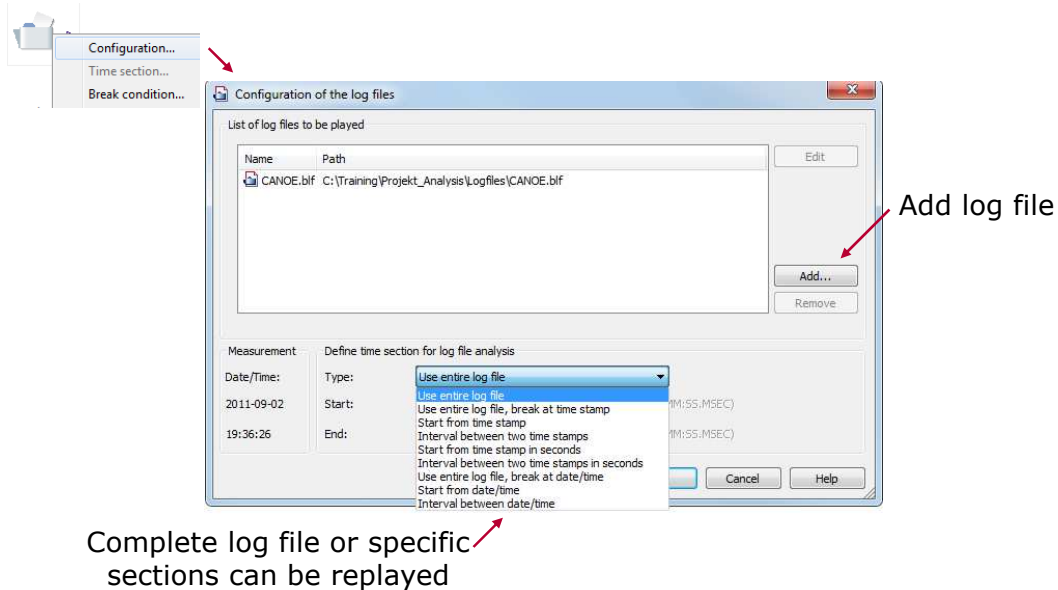
- ▶ In the *Offline Mode* the source of data are log files.
- ▶ In this way an analysis of recorded data is possible.
- ▶ The physical connection to the bus is deactivated.
- ▶ All analysis windows can be used.

Switch between
Online and *Offline*
Mode by double click
or the context menu



Configuration of data source

One or several *Logging Files* can be assigned:



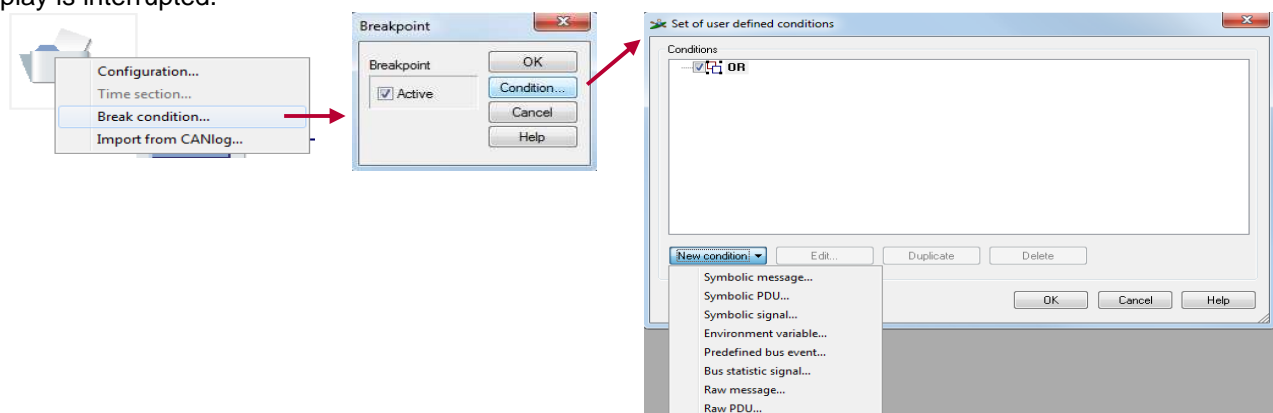
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If only one Logging File is replayed, you can define in addition if

- ▶ the complete file,
- ▶ all events from a certain starting time or
- ▶ all events in-between a starting and ending time

should be replayed. The time settings can be defined in the dialog Configuration of the log files as well as using the context menu / Time section....

Furthermore, Breakpoints can be defined: after receiving a certain message, a certain signal value etc., the Offline Replay is interrupted.



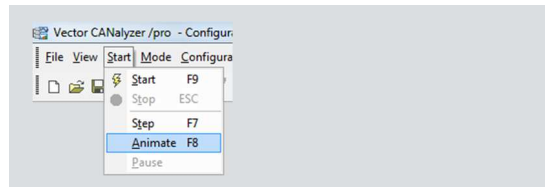
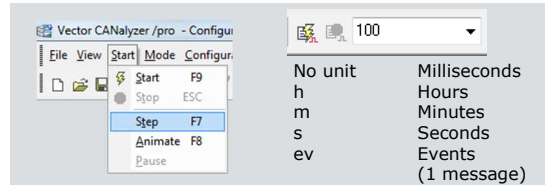
Start of the Offline Analysis

Various options are available for controlling the *Offline Analysis* :

- ▶ **Start and Stop**
 - > Entire file is played back

- ▶ **With configurable step width**
 - > There is an automatic pause at the end of the step

- ▶ **Animated flow**
 - > Slow-motion display of events



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Step mode with configurable step width

- ▶ The last message of a step is always outside the stated space of time. This avoids that there is no message in the current step because the time stamp of the next event might be higher than the current step width.
- ▶ Keyboard Shortcut: <F7>

Animated flow

The value of the delay factor for animated flow can be configured in the can.ini file. To do this, enter the following line in the [OFFLINE] section:


- ▶ AnimationDelay = nnnn

The value nnnn describes the delay factor in milliseconds (Default: 300 ms).

The delay factor means that the next event is read from the source file after nnnn ms. Read-out of events is independent of the saved time stamps. The time stamp from the source file is displayed in the Trace Window.

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Overview of CANalyzer variants

CANalyzer is available in three different variants:

- ▶ PRO: ,Professional` variant, full functionality
- ▶ EXP: ,Expert` variant, supports all applications up to complex analysis of heterogeneous systems; does not support CAPL programs
- ▶ FUN: ,Fundamental` variant, simple applications; does not support CAPL, diagnostic tester and panels

Detailed information about the variants of CANalyzer is available at our website: http://www.vector.com/vi_canalyzer_variants_en.html

Looking for more information?

Visit our website:

> <http://www.vector.com>

Sign in for a Vector training class:

> http://www.vector.com/vi_training_en.html

Need help with Vector tools?

Contact our support team:

> (248) 449 – 9290 Option 2

> support@us.vector.com

Further Information



Any more questions?

Vector Applications Support

Call our Customer Support Team
Mon-Fri during Detroit business hours

At

(248)449-9290 ext 2

support@us.vector.com