

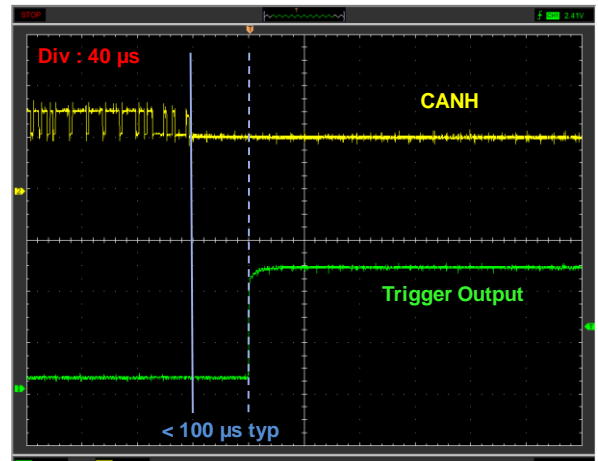
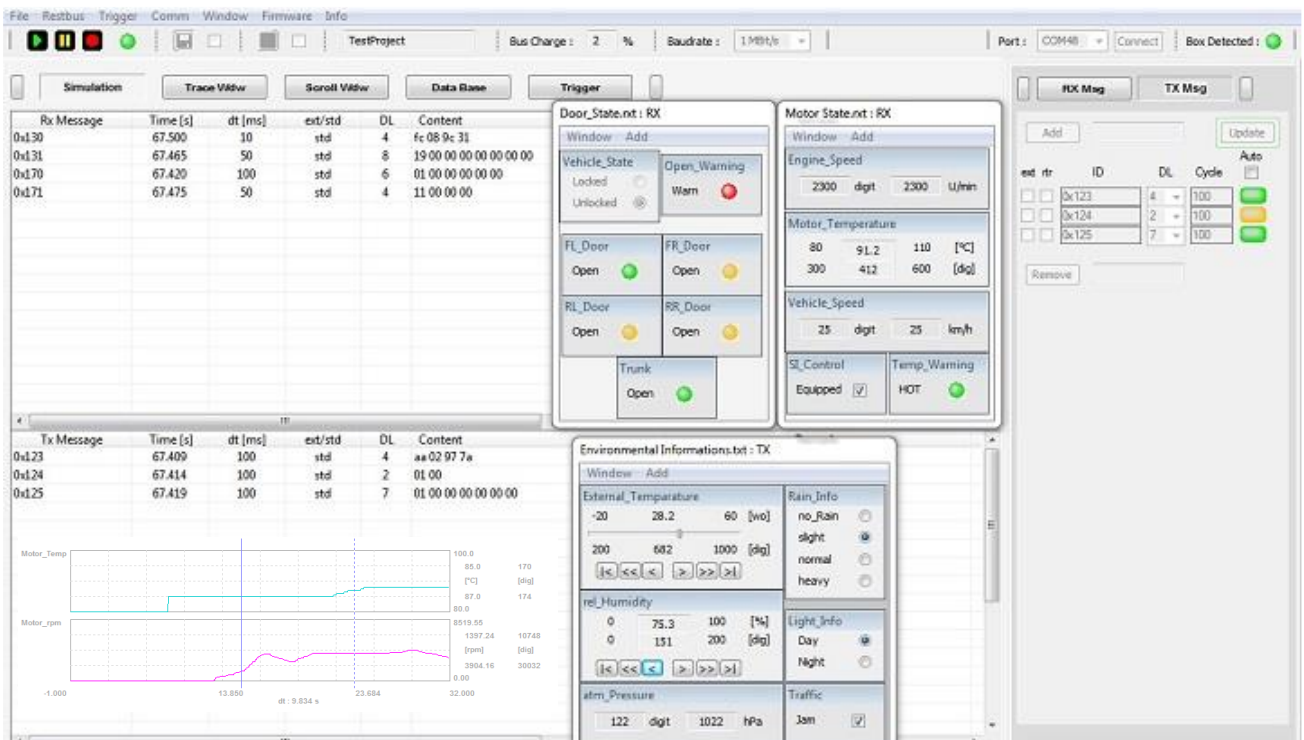
**HW Features :**

- 1 x High Speed CAN Bus up to 1 Mbit/s
- 4 x digital Signal Output / Trigger Output
  
- easy synchronization between CAN Messages and physical HW Outputs

**SW Features :**

- Can Bus Analyzing Tool
- Can Restbus Simulation Tool
- Scope Functionality : monitor up to 8 Can Signals
- RX/TX Automation in dll Mode combined with any C-Compiler supporting regular dll's
- HW/SW synchronization in dll Mode
- HW/SW synchronization by pre-defined TX Sequences
- Can Database Support
- 4 x SW configurable Trigger on CAN message contents

- ✓ including PC SW Pre-Release Version without restrictions and with upgrade privilege for future SW releases
- ✓ possibility to add or integrate customer needs within very short time
- ✓ user manual available for download : <http://www.jwe-electronics.com/>
- ✓ compatible with Windows XP / Vista / 7 / 8

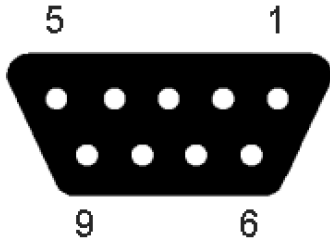



Rx Message	Time [s]	dt [ms]	ext/std	DL	Content
0x130	67.500	10	std	4	f0 08 9c 31
0x131	67.465	50	std	8	19 00 00 00 00 00 00 00
0x170	67.420	100	std	6	01 00 00 00 00 00
0x171	67.475	50	std	4	11 00 00 00

Tx Message	Time [s]	dt [ms]	ext/std	DL	Content
0x123	67.409	100	std	4	aa 02 97 7a
0x124	67.414	100	std	2	01 00
0x125	67.419	100	std	7	01 00 00 00 00 00 00

Pinout SubD 9 female Connector

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- 1 : (Trigger) Output 2
- 2 : HS CANL
- 3 : GND
- 4 : n.c.
- 5 : (Trigger) Output 3
- 6 : (Trigger) Output 1
- 7 : HS CANH
- 8 : n.c.
- 9 : (Trigger) Output 4

Hardware Series Overview

Series	High Speed CAN	LIN	Single Wire CAN	HW Output	Availability
CLDT 1xx4	1	x	x	4	✓
CLDT x1x4	x	1	x	4	Q2 / 2015
CLDT xx14	x	x	1	4	✓

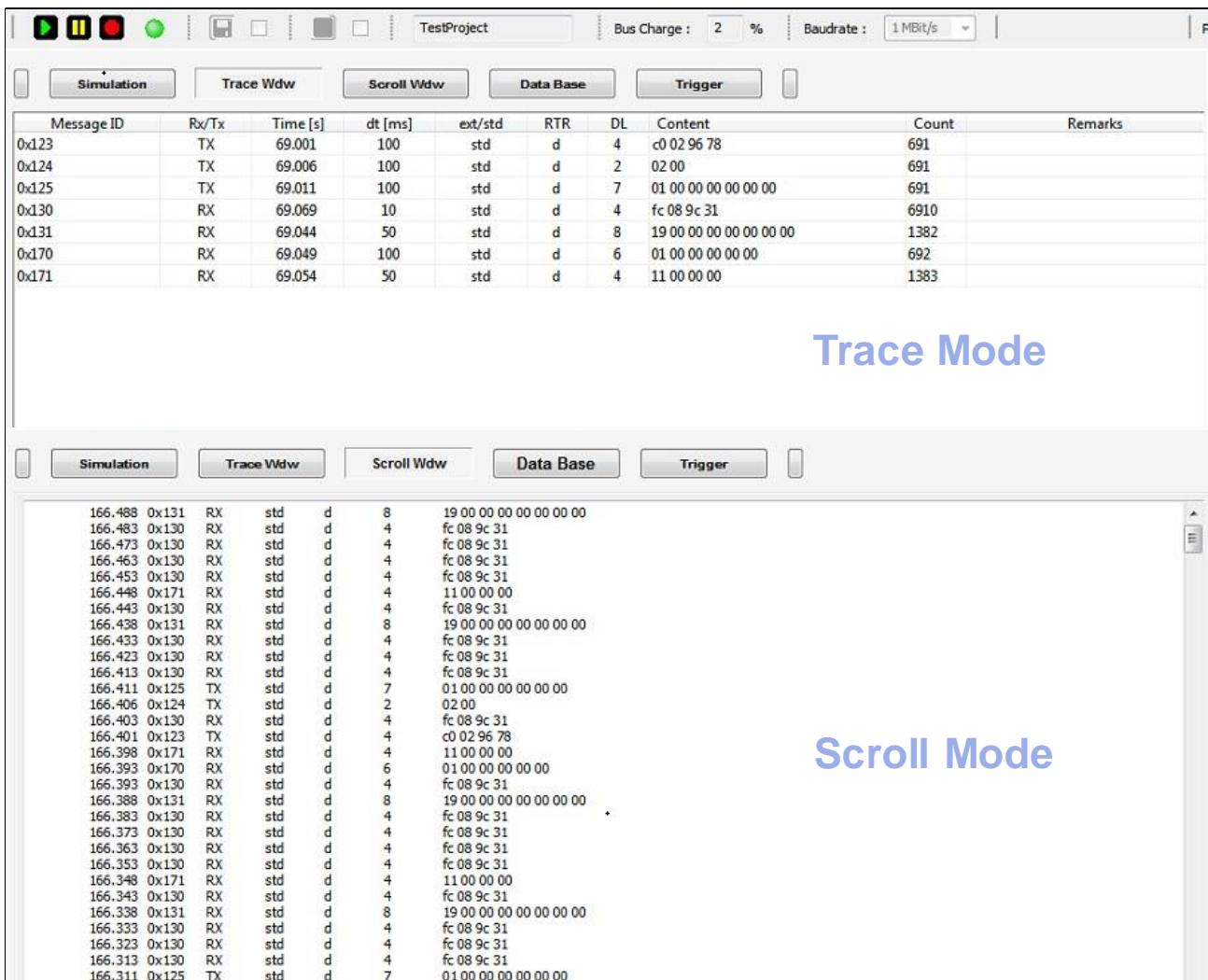
Technical Specification :

SubD 9 female Connector & USB Connector		min	typ	max
Supply Voltage	by PC USB Port		+5V	
Supply current				200 mA
Output 1 ... 4	Input Capacitor		< 10 nF	
	Output High Level		> 4 V	
	Output High Resistance		1 kΩ	
	High Level Output Current			5 mA
	Output Low Level	0.3V	0.6V	1 V
	Input Low Level Current			4 mA
GND line fuse				200 mA

## Can Bus Analyzing Tool

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- Show complete CAN Bus traffic in real time
- Display bus traffic in Trace Mode
- Display bus traffic in Scroll Mode
- Save bus traffic data in text file



The screenshot displays the CAN Bus Analyzing Tool interface. The top section shows the 'Trace Mode' view with a table of message data. The bottom section shows the 'Scroll Mode' view with a list of messages.

**Trace Mode Table:**

Message ID	Rx/Tx	Time [s]	dt [ms]	ext/std	RTR	DL	Content	Count	Remarks
0x123		69.001	100	std	d	4	c0 02 96 78	691	
0x124	TX	69.006	100	std	d	2	02 00	691	
0x125	TX	69.011	100	std	d	7	01 00 00 00 00 00 00	691	
0x130	RX	69.069	10	std	d	4	fc 08 9c 31	6910	
0x131	RX	69.044	50	std	d	8	19 00 00 00 00 00 00 00	1382	
0x170	RX	69.049	100	std	d	6	01 00 00 00 00 00	692	
0x171	RX	69.054	50	std	d	4	11 00 00 00	1383	

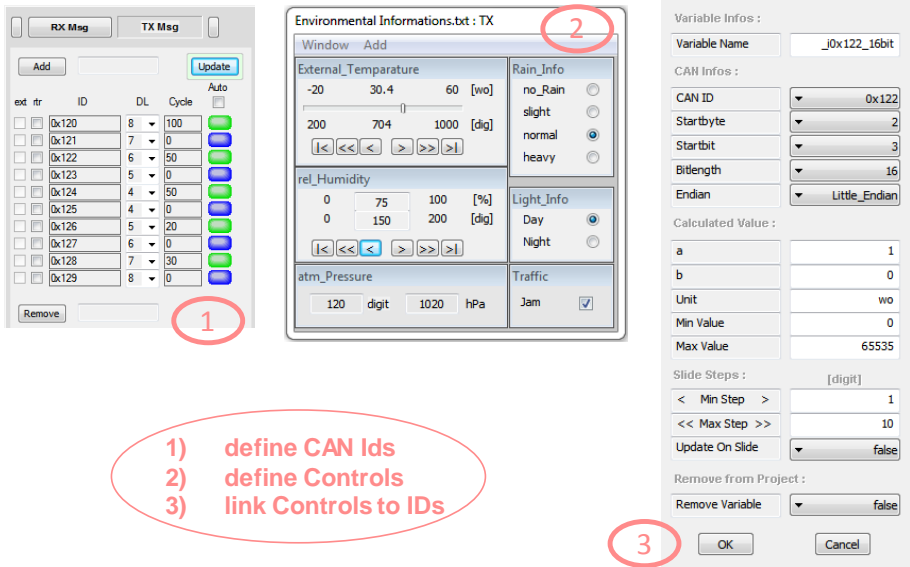
**Scroll Mode Table:**

166.488	0x131	RX	std	d	8	19 00 00 00 00 00 00 00
166.483	0x130	RX	std	d	4	fc 08 9c 31
166.473	0x130	RX	std	d	4	fc 08 9c 31
166.463	0x130	RX	std	d	4	fc 08 9c 31
166.453	0x130	RX	std	d	4	fc 08 9c 31
166.448	0x171	RX	std	d	4	11 00 00 00
166.443	0x130	RX	std	d	4	fc 08 9c 31
166.438	0x131	RX	std	d	8	19 00 00 00 00 00 00 00
166.433	0x130	RX	std	d	4	fc 08 9c 31
166.423	0x130	RX	std	d	4	fc 08 9c 31
166.413	0x130	RX	std	d	4	fc 08 9c 31
166.411	0x125	TX	std	d	7	01 00 00 00 00 00 00 00
166.406	0x124	TX	std	d	2	02 00
166.403	0x130	RX	std	d	4	fc 08 9c 31
166.401	0x123	TX	std	d	4	c0 02 96 78
166.398	0x171	RX	std	d	4	11 00 00 00
166.393	0x170	RX	std	d	6	01 00 00 00 00 00
166.393	0x130	RX	std	d	4	fc 08 9c 31
166.388	0x131	RX	std	d	8	19 00 00 00 00 00 00 00
166.383	0x130	RX	std	d	4	fc 08 9c 31
166.373	0x130	RX	std	d	4	fc 08 9c 31
166.363	0x130	RX	std	d	4	fc 08 9c 31
166.353	0x130	RX	std	d	4	fc 08 9c 31
166.348	0x171	RX	std	d	4	11 00 00 00
166.343	0x130	RX	std	d	4	fc 08 9c 31
166.338	0x131	RX	std	d	8	19 00 00 00 00 00 00 00
166.333	0x130	RX	std	d	4	fc 08 9c 31
166.323	0x130	RX	std	d	4	fc 08 9c 31
166.313	0x130	RX	std	d	4	fc 08 9c 31
166.311	0x125	TX	std	d	7	01 00 00 00 00 00 00 00

## Restbus Simulation Tool

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- ➔ Define up to 25 Rx & Tx Message Ids
  - ➔ Add Rx & Tx Simulation Windows
  - ➔ Add Rx / Tx Controls to Simulation windows
  - ➔ Link Rx / Tx Controls to the Rx / Tx Messages with Controls Properties
  - ➔ Choose Baudrate & start Restbus Simulation
- ➔ manually set TX Values in real time  
➔ manually control 4 x digital HW Output in real time  
➔ check RX Simulation Values in real time



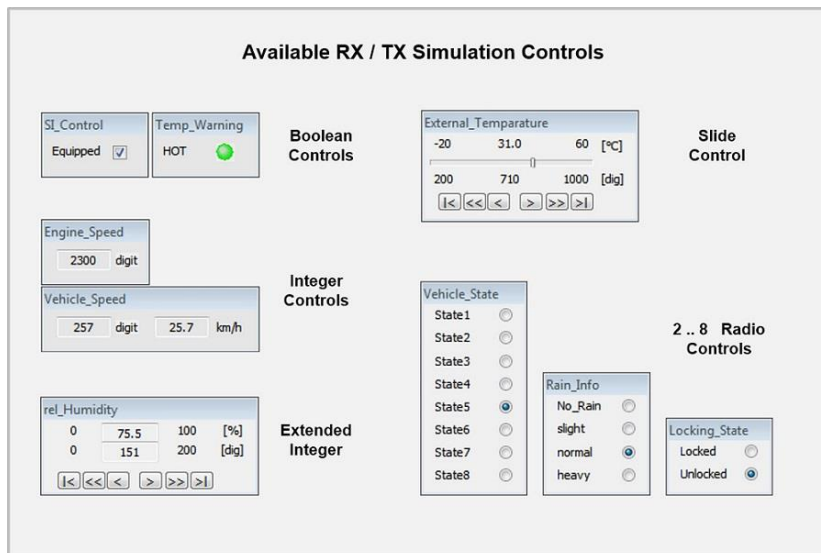
The screenshot shows three main panels in the Restbus Simulation Tool:

- Panel 1 (Left):** A table for defining CAN IDs. It has columns for 'ext', 'itr', 'ID', 'DL', 'Cycle', and 'Auto'. A red circle '1' highlights the 'Add' button.
- Panel 2 (Middle):** A control configuration window titled 'Environmental Informations.btx: TX'. It shows various sensors like 'External\_Temperature', 'rel\_Humidity', 'atm\_Pressure', 'Rain\_Info', 'Light\_Info', and 'Traffic'. A red circle '2' highlights the 'Window Add' button.
- Panel 3 (Right):** A 'Variable Infos' panel for a variable named '\_j0x122\_16bit'. It shows CAN ID (0x122), Startbyte (2), Startbit (3), Bitlength (16), and Endian (Little\_Endian). A red circle '3' highlights the 'OK' button.

Below the panels, a red oval contains the following instructions:

- 1) define CAN Ids
- 2) define Controls
- 3) link Controls to IDs

### Available RX / TX Simulation Controls

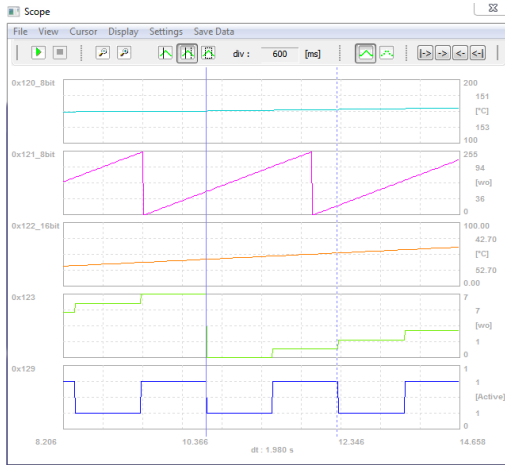


The dialog box displays several control categories:

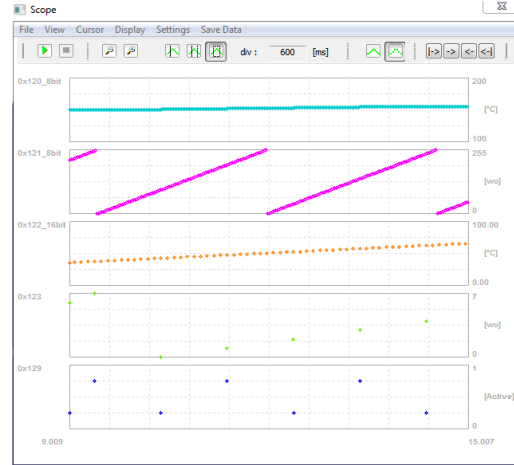
- Boolean Controls:** Includes 'SI\_Control' (Equipped) and 'Temp\_Warning' (HOT).
- Integer Controls:** Includes 'Engine\_Speed' (2300 digit) and 'Vehicle\_Speed' (257 digit, 25.7 km/h).
- Extended Integer:** Includes 'rel\_Humidity' (0 to 100 [%], 0 to 200 [dig]).
- Slide Control:** Includes 'External\_Temperature' (-20 to 60 [°C], 200 to 1000 [dig]).
- 2..8 Radio Controls:** Includes 'Vehicle\_State' (State1 to State8) and 'Rain\_Info' (No\_Rain, slight, normal, heavy).
- Locking State:** Includes 'Locking\_State' (Locked, Unlocked).

## Scope Functionality

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**Line Mode**



**Dot Mode**

- Monitor up to 8 CAN Signals in real time
- Maximum resolution of 1ms with a memory capacity of 50s
- 2 displaying modes : Line Mode & Dot Mode
- Various measuring, zooming and storing possibilities
- Save signal curves to clipboard or to text file

**Motor\_Temp**

line cursor values

100.0	Signal range max
85.0	170
[°C]	[dig]
87.0	174
80.0	Signal range min

**Motor\_rpm**

dot cursor values

8519.55	1397.24	10748
3904.16	30032	
0.00		

cursor times 13.850 dt: 9.834 s 23.684 32.000

**Channel Settings**

Channel	Variable Name	Alias	Type	min	max	auto
Channel 1:	0x121_8b	Motor_Tem	int	80.0	100.0	<input type="checkbox"/>
Channel 2:	0x122_16	Motor_rpm	int	0.00	8519.55	<input type="checkbox"/>
Channel 3:	NO_VAR	0x122_16	int	0	1	<input checked="" type="checkbox"/>
Channel 4:	NO_VAR	NO_VAR	int	0	1	<input checked="" type="checkbox"/>
Channel 5:	NO_VAR	NO_VAR	int	0	1	<input checked="" type="checkbox"/>
Channel 6:	NO_VAR	NO_VAR	int	0	1	<input checked="" type="checkbox"/>
Channel 7:	NO_VAR	NO_VAR	int	0	1	<input checked="" type="checkbox"/>
Channel 8:	NO_VAR	NO_VAR	int	0	1	<input checked="" type="checkbox"/>

OK Cancel Update

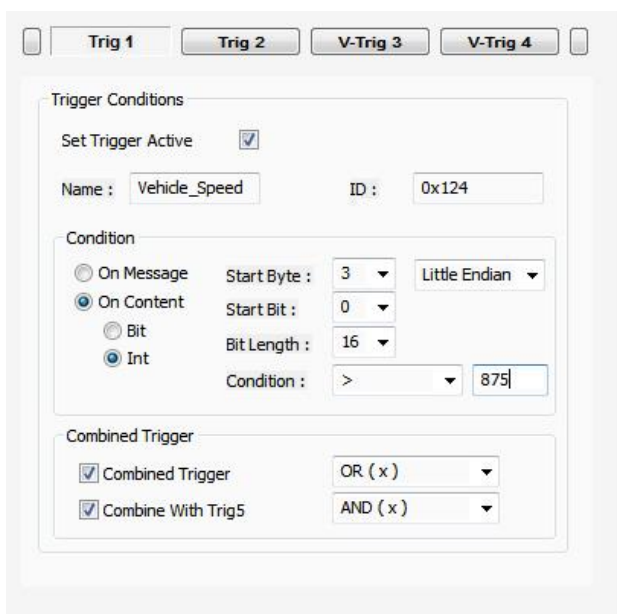
Insert signal range that shall be displayed

insert signal names in Alias column

## 4 x physical HW Trigger Outputs

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- create up to 8 different trigger events
- high flexibility by combining trigger events
- 4 x physical trigger output, 4 x virtual trigger (to create combined trigger events)
- Trigger reaction time < 100  $\mu$ s typ.
- Output rising / falling time < 50  $\mu$ s typ.



Trig 1 Trig 2 V-Trig 3 V-Trig 4

Trigger Conditions

Set Trigger Active

Name : Vehicle\_Speed ID : 0x124

Condition

On Message Start Byte : 3 Little Endian

On Content Start Bit : 0

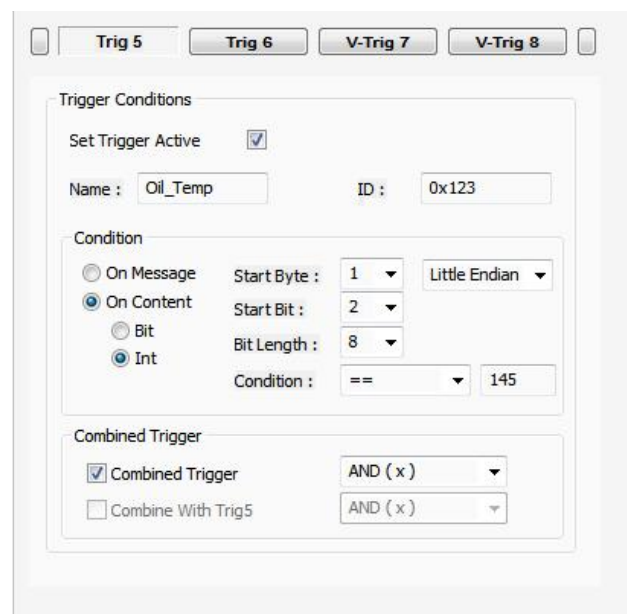
Bit Bit Length : 16

Int Condition : > 875

Combined Trigger

Combined Trigger OR ( x )

Combine With Trig5 AND ( x )



Trig 5 Trig 6 V-Trig 7 V-Trig 8

Trigger Conditions

Set Trigger Active

Name : Oil\_Temp ID : 0x123

Condition

On Message Start Byte : 1 Little Endian

On Content Start Bit : 2

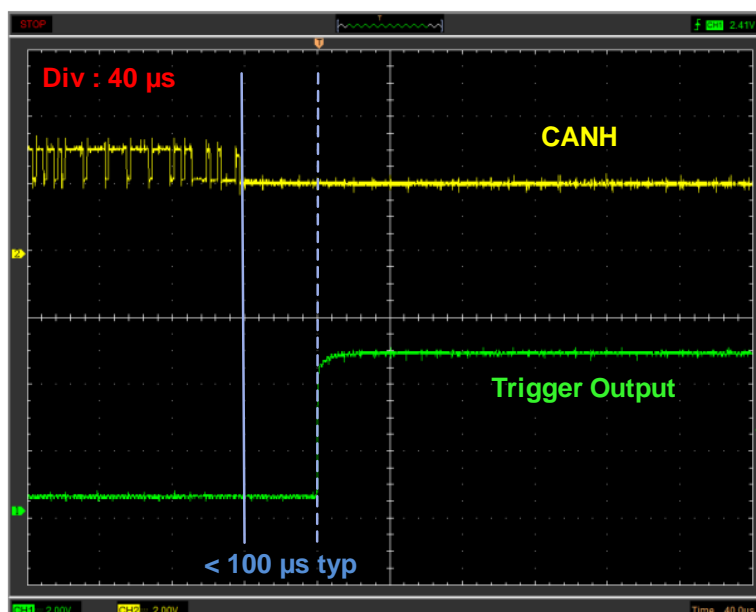
Bit Bit Length : 8

Int Condition : == 145

Combined Trigger

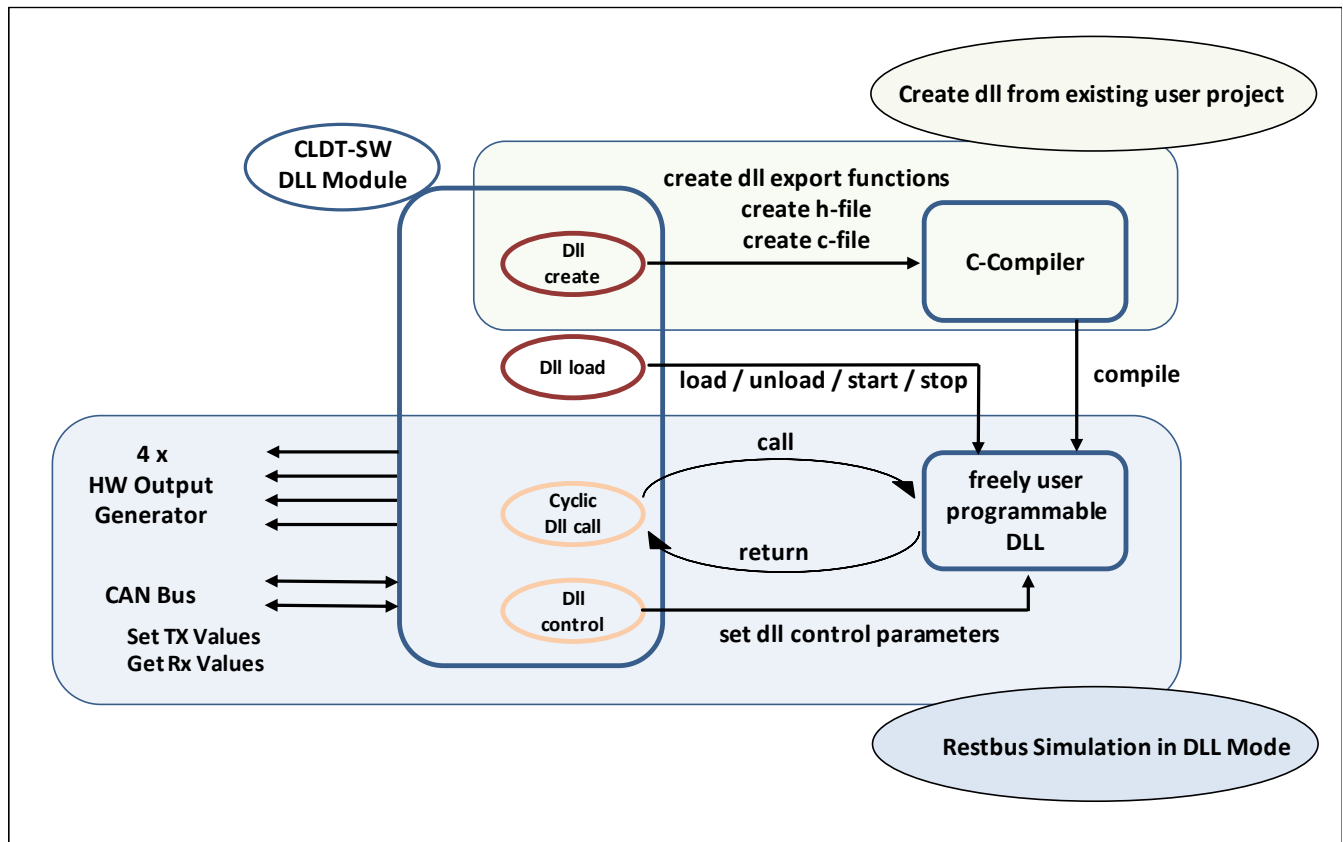
Combined Trigger AND ( x )

Combine With Trig5 AND ( x )



## RX / TX Automation in dll Mode

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- In CLDT SW create a Restbus Simulation Project and define CAN RX & TX Signals
- Auto-create a dll project for a C-Compiler (e.g. LCC- or Microsoft VC++ Compiler) with CLDT SW
- Write the user specific functional logic in C or C++ → pre-defined C-functions
  - control TX CAN Bus Values / Messages
  - read RX CAN Bus Values / Messages
  - control 4 x physical HW Output & thereby synchronize HW with RX or TX CAN Bus Data
- Compile dll with C-Compiler
- Load dll with the CLDT SW
- Start Restbus Simulation in dll Mode
- See next page for a simple example, compiled with LCC-Win32 Compiler

## RX / TX Automation in dll Mode : Example

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Compiled with LCC-Win32 Compiler

```
//
// RX TX Automation
void vRxTxLogic(i64DeltaT) // timer resolution : ns
{
//
// count Timers
_i64TimerOp6 += i64DeltaT; // Timer for Output 6 curve generation
_i64Timer10ms += i64DeltaT; // Timer 10ms tasks
_i64Timer100ms += i64DeltaT; // Timer 100ms tasks

//
// generate digital Output 6 curve // physical HW Output 4 is logical Output 6

if (_bRxMsg3 == TRUE)
{
_i64TimerOp6 = 0; // start curve generation each time
// when RX msg 3 has been received

int iTimer100ns = _i64TimerOp6 / 100000; // --> resolution : ms/10

if (iTimer100ns >= 0) { _bOp6 = LOW; } // 0ms ... 10ms
if (iTimer100ns >= 100) { _bOp6 = HIGH; } // 10ms ... 15ms
if (iTimer100ns >= 150) { _bOp6 = LOW; } // 15ms ... 25ms
if (iTimer100ns >= 250) { _bOp6 = HIGH; } // 25ms ... 27ms
if (iTimer100ns >= 270) { _bOp6 = LOW; } // 27ms ... 29ms
if (iTimer100ns >= 290) { _bOp6 = HIGH; } // 29ms ...

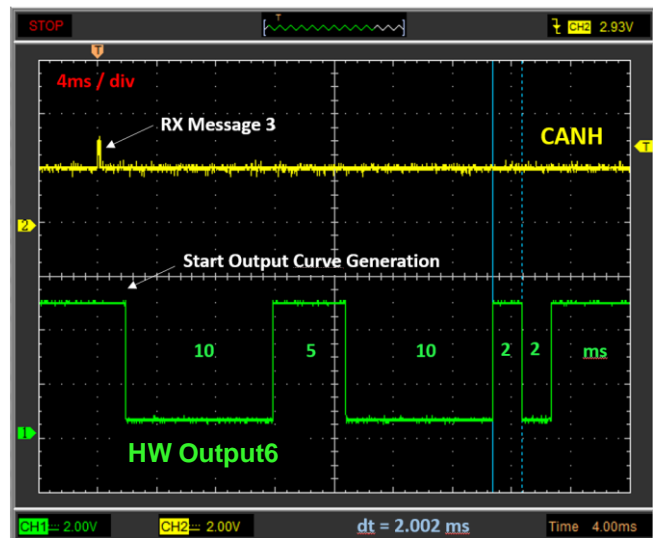
//
// time management

if (_i64Timer10ms > _10MS)
{
_i64Timer10ms -= _10MS;
vTask10ms();
}

if (_i64Timer100ms > _100MS)
{

```

Measured Result



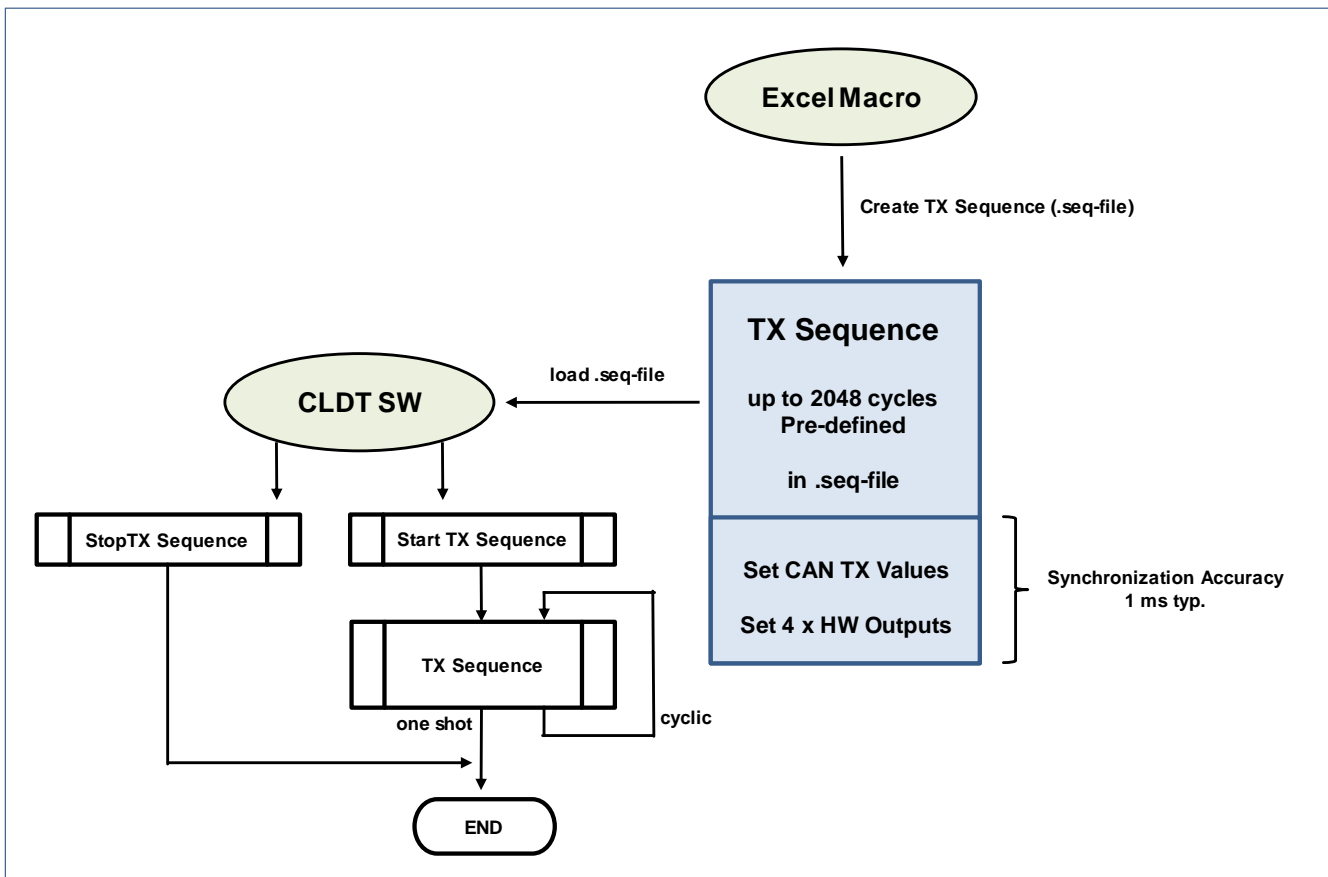
- Create Restbus Simulation project
- Create dll with C-Compiler
- Load dll with CLDT SW



## Pre-defined TX Sequences

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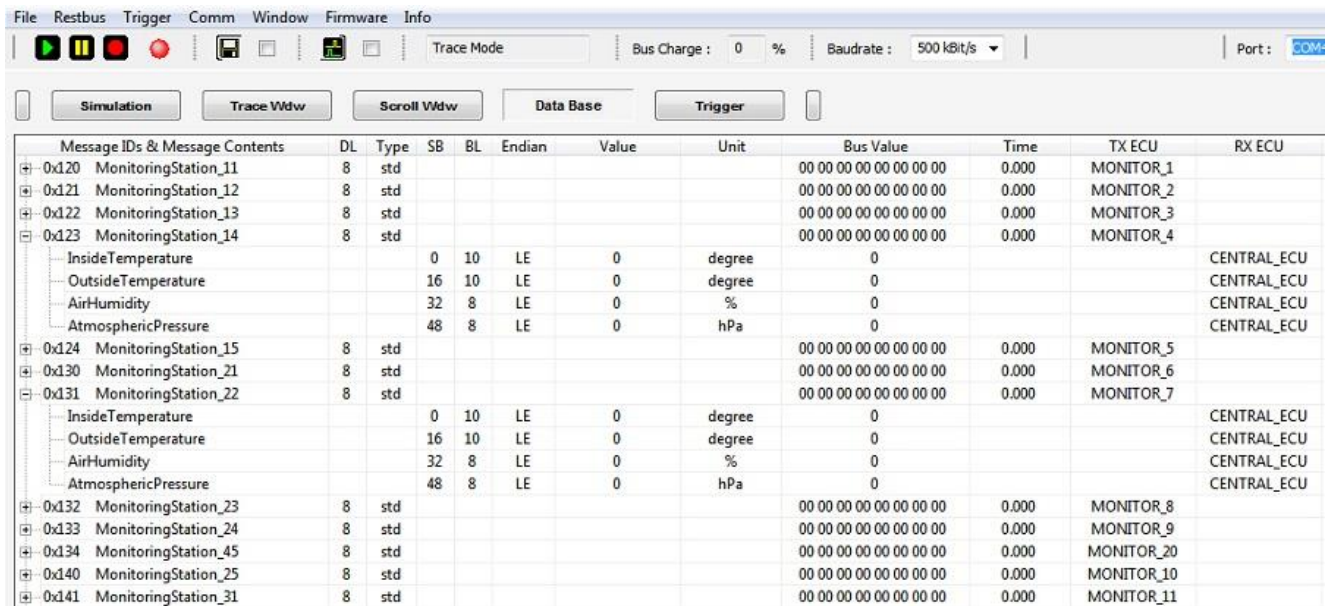
- Pre-define a Tx Sequence with up to 2048 Tx Cycles
- Synchronize Tx Messages with 4 x physical digital Outputs
- Accuracy : 1ms typ.
- Apply Tx Sequence in cyclic or one shot mode
- Use Excel Macros to create Tx Sequence files .seq in correct format



## CAN Data Base Support

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- Analyze CAN Messages and CAN Signals in Can Data Base Mode
- Displaying Mode : Tree Mode
- .dbc file format supported



Message IDs & Message Contents	DL	Type	SB	BL	Endian	Value	Unit	Bus Value	Time	TX ECU	RX ECU
0x120 MonitoringStation_11	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_1	
0x121 MonitoringStation_12	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_2	
0x122 MonitoringStation_13	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_3	
0x123 MonitoringStation_14	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_4	
InsideTemperature			0	10	LE	0	degree	0			CENTRAL_ECU
OutsideTemperature			16	10	LE	0	degree	0			CENTRAL_ECU
AirHumidity			32	8	LE	0	%	0			CENTRAL_ECU
AtmosphericPressure			48	8	LE	0	hPa	0			CENTRAL_ECU
0x124 MonitoringStation_15	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_5	
0x130 MonitoringStation_21	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_6	
0x131 MonitoringStation_22	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_7	
InsideTemperature			0	10	LE	0	degree	0			CENTRAL_ECU
OutsideTemperature			16	10	LE	0	degree	0			CENTRAL_ECU
AirHumidity			32	8	LE	0	%	0			CENTRAL_ECU
AtmosphericPressure			48	8	LE	0	hPa	0			CENTRAL_ECU
0x132 MonitoringStation_23	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_8	
0x133 MonitoringStation_24	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_9	
0x134 MonitoringStation_45	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_20	
0x140 MonitoringStation_25	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_10	
0x141 MonitoringStation_31	8	std						00 00 00 00 00 00 00 00	0.000	MONITOR_11	