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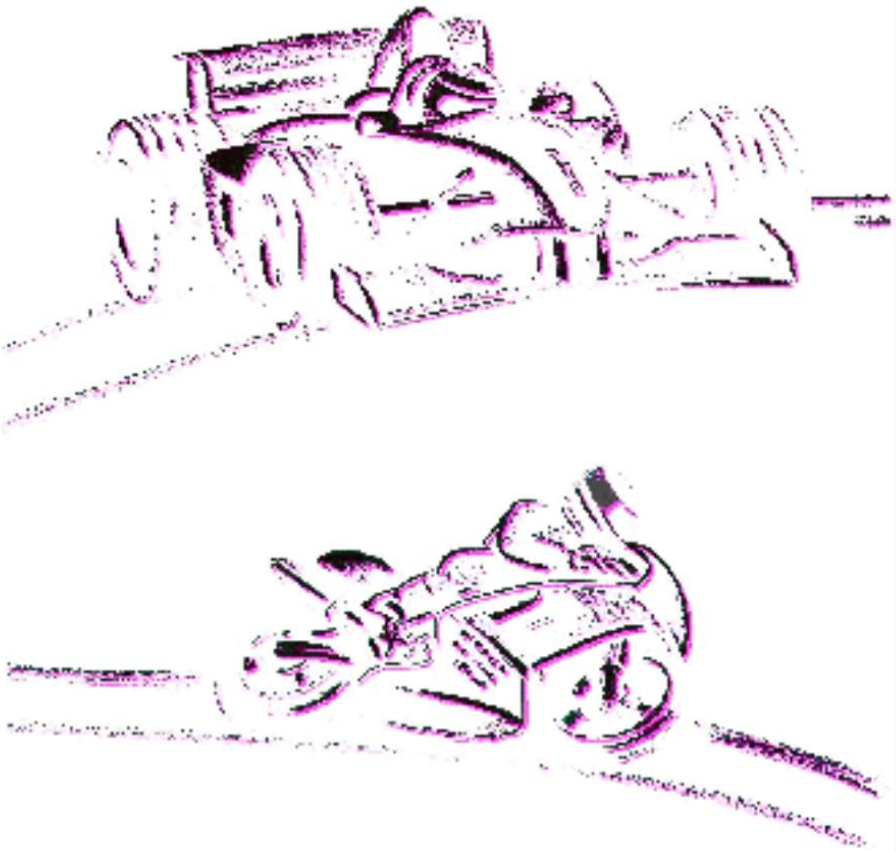
- English -



Transponder X2

Creating Lap- and Section-Times

Revision History

Revision	Description	Release Date	Author
0	Initial Release	2021-09-14	FS

Content

1 Notes and symbols used in this manual

- In the paragraphs highlighted with this symbol, you will find tips and practical advice to work with the 2D-Software.

- Documentation reference to another manual

- In the paragraphs highlighted with this symbol, you will find additional information. It is very important that you follow the instructions given.

2 Preface

The TransponderX2 system is used in many racing classes for lap and section timing and for further communication between race control and the drivers.

For this purpose, the beacon loops are embedded in the asphalt on many tracks.

The interaction of the transponder with the embedded loops can also be used to create lap or section times in 2D system via the TransponderX2.

Documentation reference
The Transponder X2 can be purchased via the Mylaps website https://www.mylaps.com/

At 2D laptimes can be online created in many different ways, e.g., using GPS coordinates or TransponderX2 messages as laptrigger signals.

- Respective manual for creating laptimes via GPS coordinates can be found at our website: www.2D-Datarecording.com/manuals/

For teams using TransponderX2 and Laptiming via GPS alternately, the GPS/GNSS2CAN module is able to create laptrigger signals as normally via GPS coordinates but sends laptrigger signal on TransponderX2-CAN-Identifier to simulate the TransponderX2 module.

This means that when switching between the two laptime generation options, only the modules need to be changed and <u>no</u> settings need to be changed!

- For easy switching between the two laptime generation options, an adapter cable can be purchased from 2D to connect the GPS/GNSS2CAN module to the system's designated TransponderX2 connector.

- Please see the manual *GPS/GNSS Modules* at download area of the 2D website for setting example: www.2D-Datarecording.com/manuals/

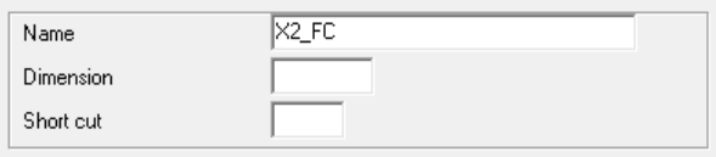
Creating and analysing laptimes is also possible in post-processing via Analyzer.

- Please see the manual *Laptiming Analyzer* at download area of the 2D website: www.2D-Datarecording.com/manuals/

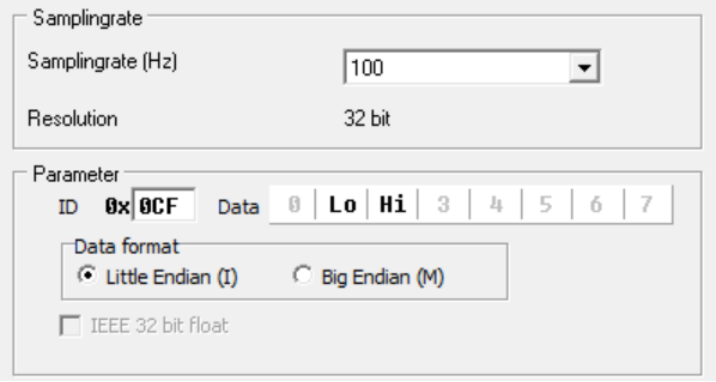
3 Connect TransponderX2 module

At all 2D modules which are used with TransponderX2 messages, the CAN-IN channel of TransponderX2 message must be added manually in modules CAN-IN group:

General:



Parameters:

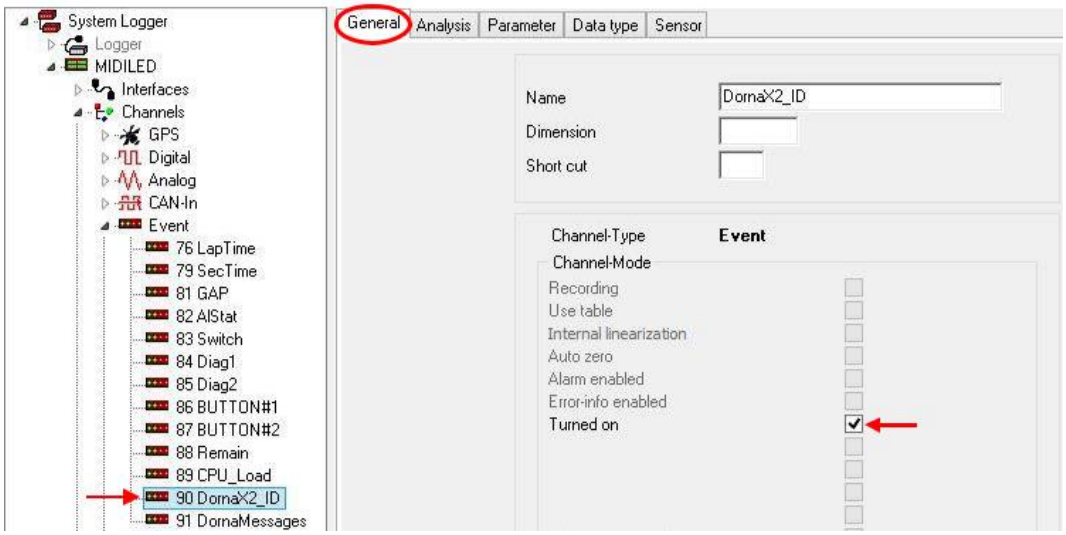


4 Check availability of TransponderX2 module

- Since 2017 it is requested by the **Dorna** to check if the TransponderX2 is connected correctly to the Datarecording system. **This check happens when the system is turned on.**

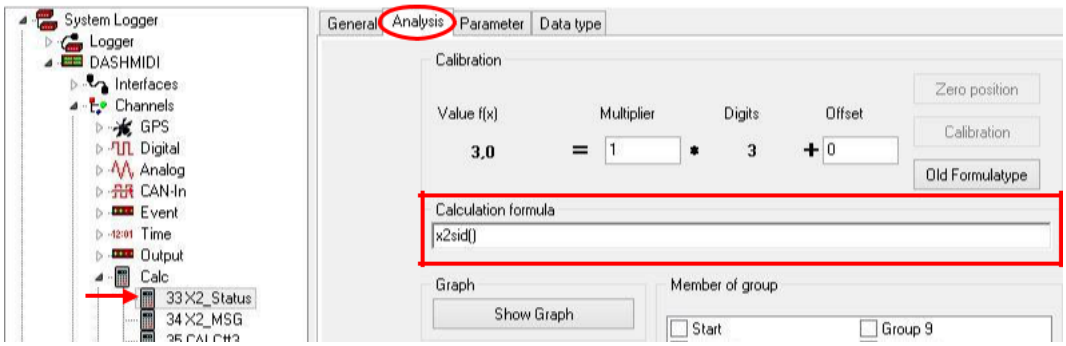
Check TransponderX2 availability:

1. Request the transponders ID by turning on the modules Event-channel *DornaX2_ID*



- If TransponderX2 is connected correctly, the Serialnumber of Transponder is shown at Event *DornaX2_ID*

2. Check the outcome of the request with a CALC-channel.
   In this example this CALC-channel is named “X2_Status” and programmed with the calculation formula *x2sid()*



The possible results are:

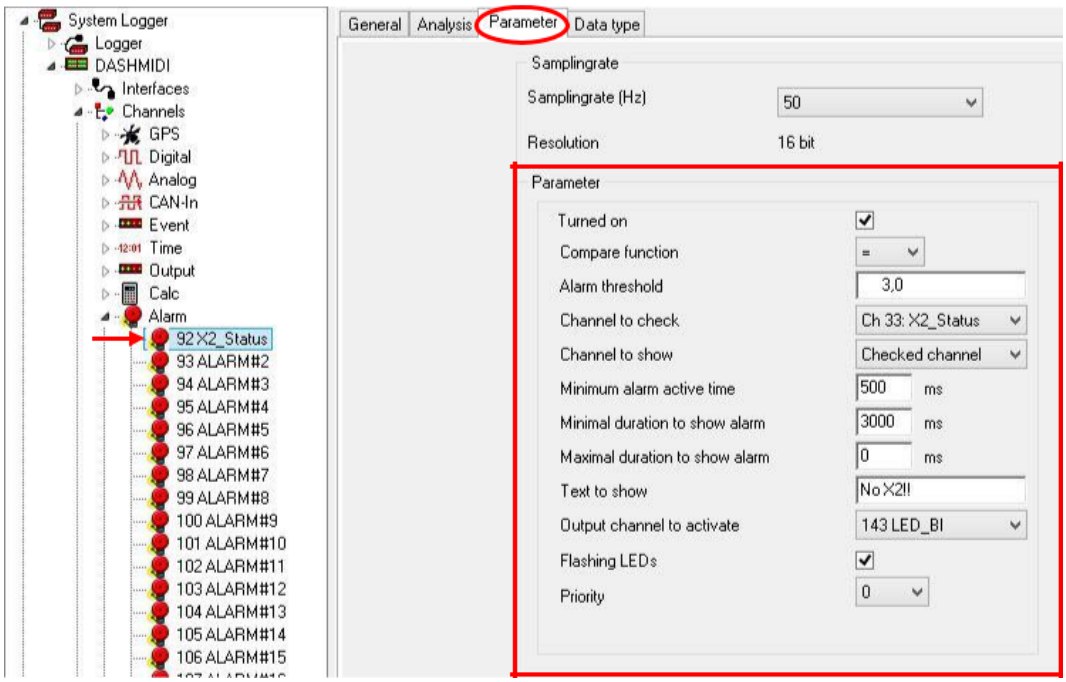
0 ⇒ Channel DornaX2_ID not turned on

1 ⇒ The X2 transponder´s ID is requested

2 ⇒ The X2 transponder´s ID is received

3 ⇒ After 10s there is still no ID received ⇒ no transponder connected

3. To show the result of availability check on the display an alarm channel is used:



4. Confirm your changes with <**Apply**>.

5 Laptimes

At 2D laptimes can be created in many different ways, e.g., using GPS coordinates or TransponderX2 messages as laptrigger signals.

Documentation reference
Respective manual for creating laptriggers via GPS coordinates can be found at our website:
www.2D-Datarecording.com/manuals/

This document is describing how to set up lap and section timing functionality via **TransponderX2 messages**.

- Loggers and Dashboards are able to process transponderX2 messages as a trigger signal!
- It is important that laptimes should always be calculated in just one module of a system only and, if available, is only used in other modules! Which module is used for laptime calculation depends on the application.

  Please see the setting examples in appendix (8.2)!

5.1 Selecting the trigger channel for LAPTIME-Event

The following modules are able to calculate laptimes via TransponderX2 messages:

- Logger
- Dashboards

This event function can be found inside the system tree via ***<Channels>*** → ***<Event>*** → ***<Laptime>*** and calculates the laptimes from the trigger signal of TransponderX2 messages.

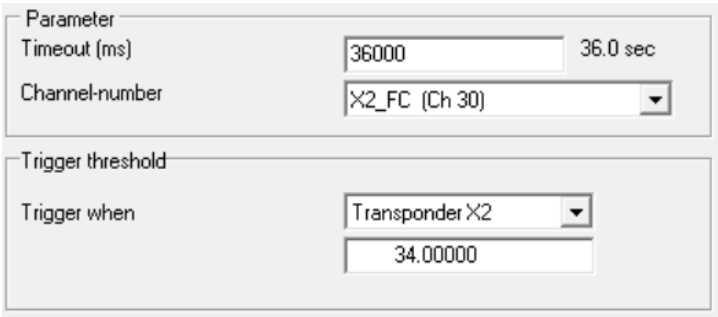
To turn on this function, open the tab ***<General>,*** then select the *Turned on* checkbox.

To define the triggering channel, open the tab ***<Parameter>***, select the correct trigger channel (*#X2_CF*) from the *Channel-number* dropdown-box.

The *Timeout* option can be used to prevent repeated laptime activation (false lap triggers or shortcuts) by entering a time value (in milliseconds), ensuring no laptimes are generated until the time elapses.

The frequency at which the triggering channel is checked for changes is defined by the ***<Samplingrate>.***

At ***<Trigger threshold area>*** *Transponder X2* must be selected from dropdown-box.



Track Loop		
Id	Description	OC width (ms)
3	Pit Entry	15
18	Pit Exit	90
20	Top Speed	100
22	IP1	110
24	IP2	120
26	IP3	130
30	Finish Line*	150
34	Lap Trigger	170

- The TransponderX2 value for laptriggers is either *30* or *34*, what depends on the current racetrack!

Confirm your changes with <**Apply**>.

The Laptime-Event-channel can be sent via CAN to other 2D CAN modules (e.g. loggers) or recorded like other channels!

6 Section times

At 2D section times can be created in many different ways, e.g., using GPS coordinates or TransponderX2 messages as laptrigger signals.

Documentation reference
Respective manual for creating section triggers via GPS coordinates can be found at our website:
www.2D-Datarecording.com/manuals/

This document is describing how to set up lap and section timing functionality via **TransponderX2 messages**.

- Loggers and Dashboards are able to process transponderX2 messages as a trigger signal!
- It is important that laptimes should always be calculated in just one module of a system only and, if available, is only used in other modules!

  Which module is used for laptime calculation depends on the application.

  Please see the setting examples in appendix (8.2)!

6.1 Selecting the trigger channel for SECTIME-Event

The following modules are able to calculate section times via TransponderX2 messages:

- Logger
- Dashboards

This event function can be found inside the system tree via ***<Channels>*** → ***<Event>*** → ***<Sectime>*** and calculates the laptimes from the trigger signal of TransponderX2 messages.

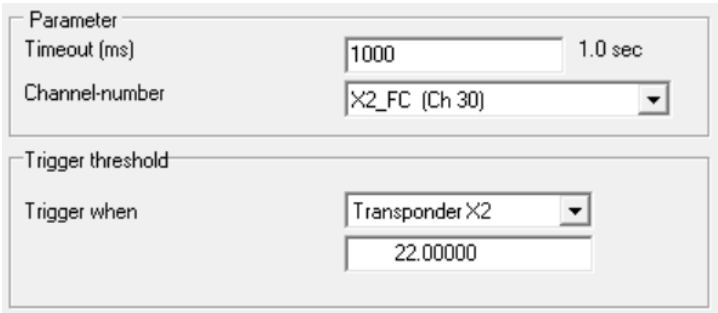
To turn on this function, open the tab ***<General>,*** then select the *Turned on* checkbox.

To define the triggering channel, open the tab ***<Parameter>***, select the correct trigger channel (*#X2_CF*) from the *Channel-number* dropdown-box.

The *Timeout* option can be used to prevent repeated laptime activation (false lap triggers or shortcuts) by entering a time value (in milliseconds), ensuring no laptimes are generated until the time elapses.

The frequency at which the triggering channel is checked for changes is defined by the ***<Samplingrate>.***

At ***<Trigger threshold area>*** *Transponder X2* must be selected from dropdown-box.



Track Loop		
Id	Description	OC width (ms)
3	Pit Entry	15
18	Pit Exit	90
20	Top Speed	100
22	IP1	110
24	IP2	120
26	IP3	130
30	Finish Line*	150
34	Lap Trigger	170

- If value 22 is entered, all TransponderX2-IDs between 22 and 29 are detected as section triggers!

Confirm your changes with <**Apply**>.

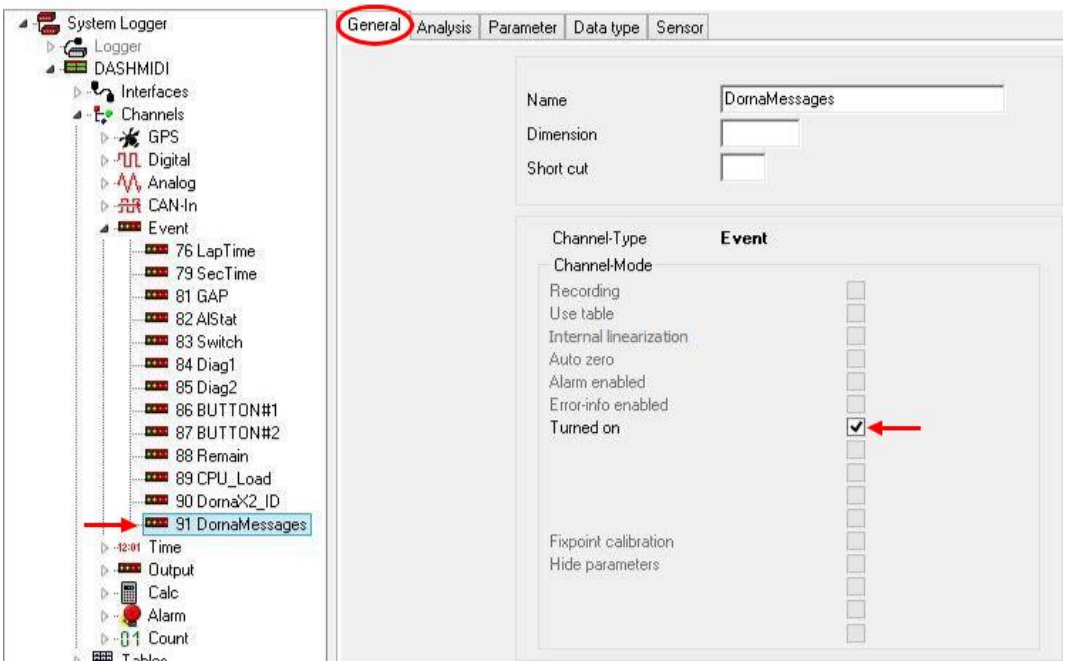
The Laptime-Event-channel can be sent via CAN to other 2D CAN modules (e.g. loggers) or recorded like other channels!

- Respective Dashboard manual for further Section times display settings can be found at 2D website: www.2D-Datarecording.com/manuals/

7 How to display flags and other X2 related messages

- Since 2017 the dashboards should be able to display more X2 related information than just the Flags and Dorna info messages. To handle this amount of information the dash´s programming has changed.

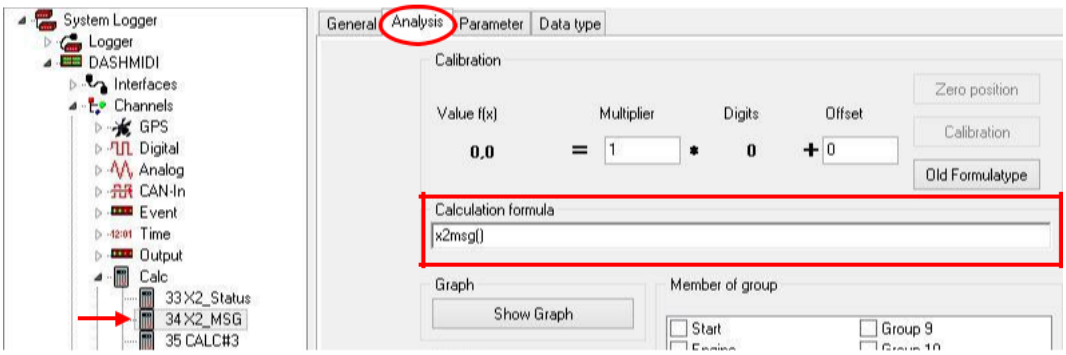
To display the Dorna flags, info messages, box calls and team notification the Event-channel DornaMessages must be switched on.



- This channel receives all message information and displays them automatically until the signal is taken back.

As it is mandatory to use the flags with an dashboards LED, these signals have to be separated from the others. To do this, a CALC-channel, which indicates what kind of signal is received is used.

In this example the CALC-channel is named *X2_MSG* and programmed with the calculation formula *x2msg()*



The information of this channel is bit coded:

Bit 1 ⇒ value 1 ⇒ ID received

Bit 2 ⇒ value 2 ⇒ flag received

Bit 3 ⇒ value 4 ⇒ Dorna info message received

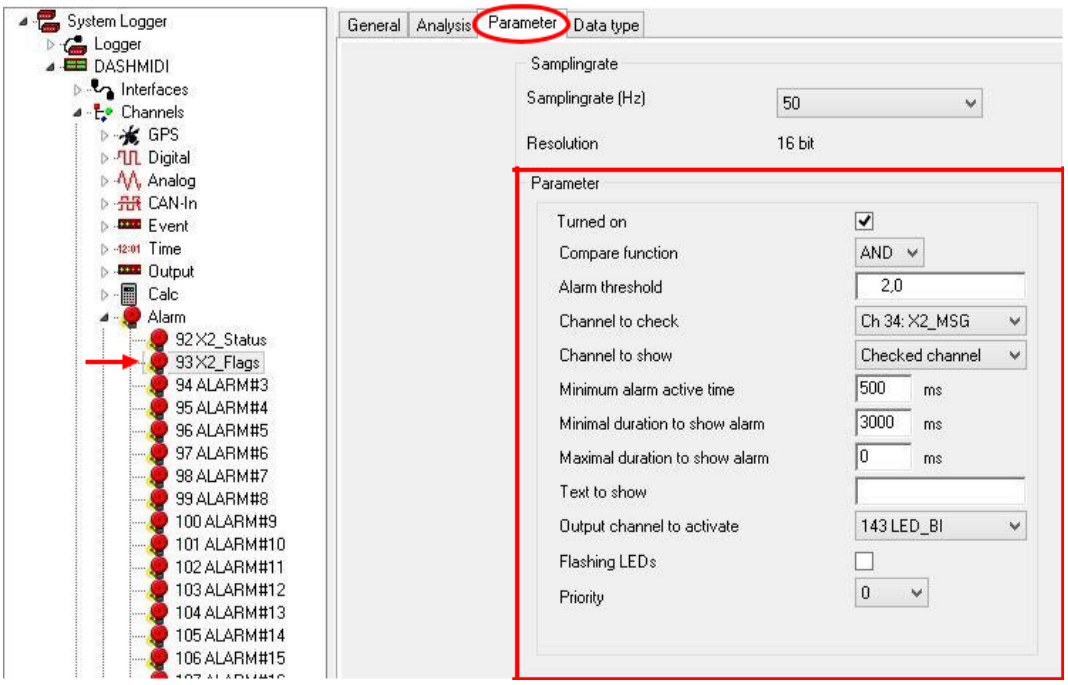
Bit 4 ⇒ value 8 ⇒ box call received

Bit 5 ⇒ value 16 ⇒ team notification received

To light up the LED an alarm channel must be programmed, where the CALC-channel *X2_MSG* is selected as source channel.

- The trigger condition “AND 2” must be set for only launching an alarm when a flag is received.

Other Alarm-parameters (Duration to show alarm, LED for indication priority,…) are set as desired.



Confirm your changes with <**Apply**>.

8 Appendix

8.1 Portrayal of X2 Team notifications and Box call

The X2 transponder´s team notification and box call are a possibility to have a virtual pit board on the bike´s dash. To display the information without further programming, the settings are preprogrammed and fixed.

Practice Info:

P 4	35.0s	Own position	Target time (only seconds)
Pole	35.1s		P1 Time (only seconds)
Remain	8:15		Remaining time

Race Info:

P 4	Laps 13	Own position	Remaining laps
<36	1.1s	Racer ahead	Gap ahead
>65	2.5s	Racer behind	Gap behind

Opponent Info:

#52	1:15.8	Rider	Laptime
GAP	3.1s S	Gap	Tire option
ExtHrd	Hard	Front tire	Rear tire

Tire options: Slick (S), Intermediate (I), Wet (W)

Tire type: Extra soft (ExtSof), Soft, Medium, Hard, Extra hard (ExtHrd)

Suggested mapping:

Suggested Mapping 5

Being followed:

Being Followed #47

Racer out:

Racer Out #47

Box Call:

Box Call: Bike change

Box Call:

Call reason

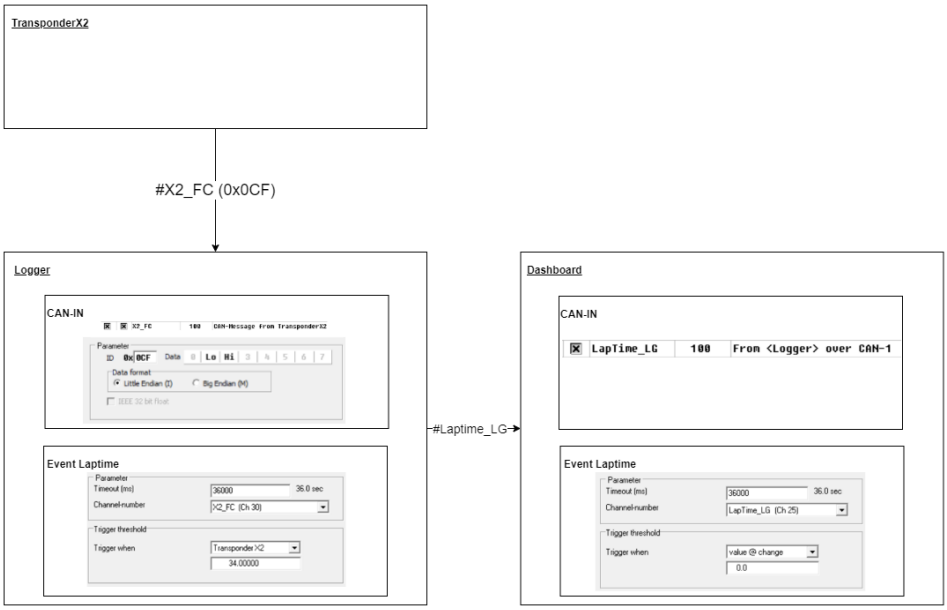
8.2 Laptime setting examples

As already mentioned, various 2D modules are capable of calculating a laptime and since for most applications it is not sufficient to only calculate the laptime but also to display it, a sensible structure, i.e. where the laptime is calculated or displayed, should be set up, which strongly depends on the later use.

8.2.1 Example 1 – Creating laptimes by TransponderX2 - Logger

The setup is explained in this example by the fact that the laptrigger signals are generally acquired via **Transponder X2 messages**, the logger calculates, transmits, and records the laptime, and the dashboard only displays the laptime.

- The laptime is also recorded in logger.



- **Value @ change**: Laptime is not calculated but received laptime can used for displaying or recording!
- **TransponderX2**: Laptime is calculated, recorded, and also can be used for displaying!

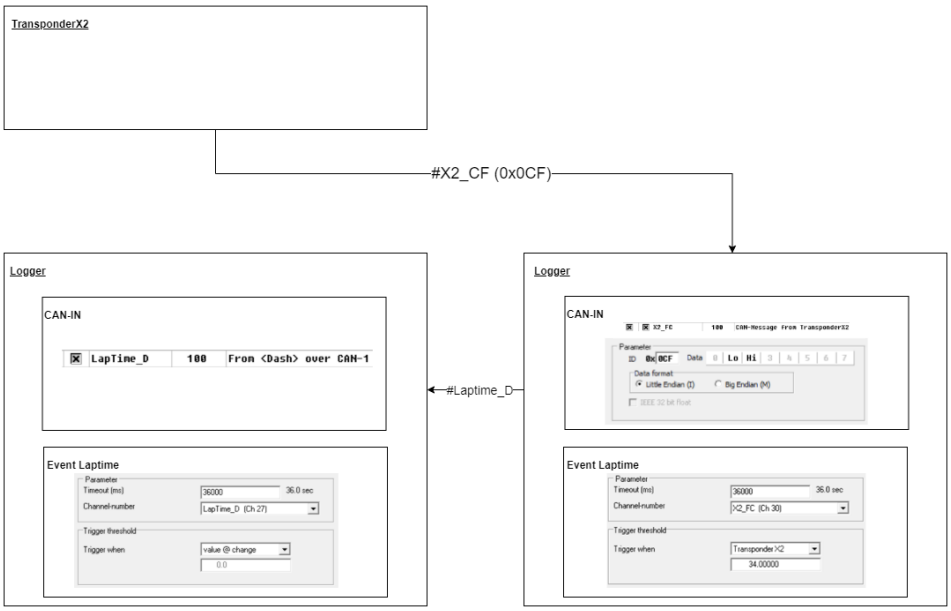
- The TransponderX2 value for laptriggers is either *30* or *34*, what depends on the current racetrack!

8.2.2 Example 2 – Creating laptimes by TransponderX2 - Dashboard

The setup is explained in this example by the fact that the laptrigger signals are generally acquired via T**ransponder X2 messages**.

In this example, the **Dashboard** calculates and transmits the laptime via CAN to the logger.

- The laptime is also recorded in logger.



- **Value @ change**: Laptime is not calculated but received laptime can used for displaying or recording!
- **TransponderX2**: Laptime is calculated, recorded, and also can be used for displaying!

- The TransponderX2 value for laptriggers is either *30* or *34*, what depends on the current racetrack!

8.3 Testing Laptime in box

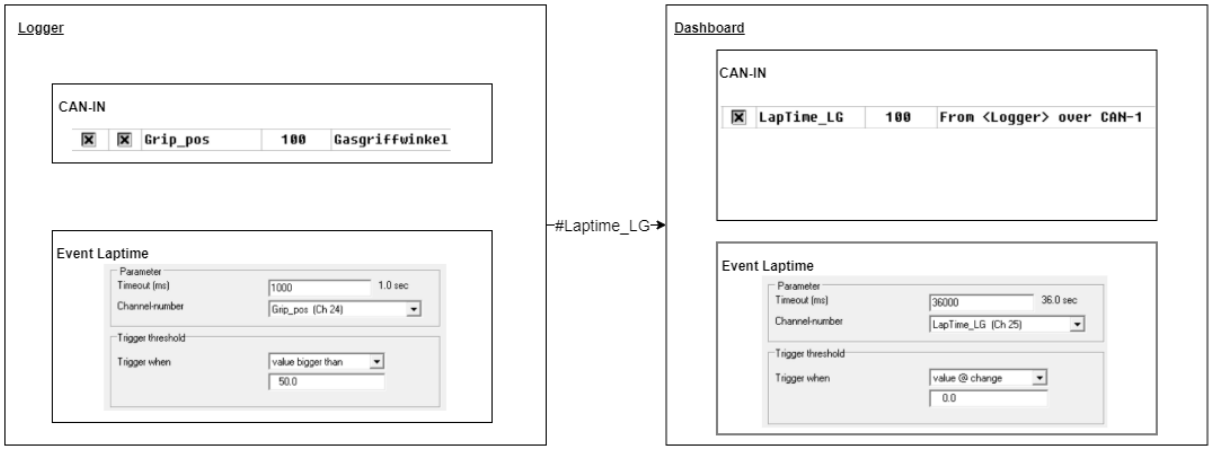
Because it is not always possible to test that Laptimes are created and displayed correctly, the following example can be used to test the Laptime creation in the box without going out on track.

- It is assumed that the laptime is generated in a logger, which is connected to a bike's CAN bus to access the vehicles data, and the laptime is only displayed at a dashboard (Example 2)
- Please note down the correct settings of creation of laptrigger via TransponderX2 messages

In this example the channel *#Grip_pos* is received via CAN bus and recorded in the loggers CAN-IN channels.

This channel is used as Trigger channel for Laptime event with the condition that a trigger is only created when the value of #Grip_pos is bigger than 50.

- Timeout values must also be adjusted to test creation of laptimes in box!



Now the throttle grip of the bike can be used to trigger the Laptimes event, and the dashboard can be used to check if laptime is created correctly.

- Please reset the parameters for creation of laptimes via TransponderX2 messages

8.4 PitTimer

Using *Online Calculation Channels* the 2D modules are able to create a PitTimer which is very useful when a minimum pitlane time is enforced by regulation of race classes or for any other timer applications.

MidiDash, **Big**Dash and **TFT**Dash are able to handle power-off phases during pit stop and PitTimer will show the correct, remaining time when system is powered again.

By using the PitTimer-example a timer can be created which shows the time left before the vehicle can leave the pits after a pitstop.

Important information
By using a 2D dashboard that is able to store the values of m-variables during shutdown, the PitTimer will also work if the car is shut down during the pit stop! 2D already offers a similar function for the GT3 Endurance class with the SectionTime event, but it is not intended to switch off the car during the pitstop.

For starting and reseting the timer, the PitTimer function has been designed so that <u>any</u> channel can be selected as a trigger for the timer start and stop.

For example, the Dorna-TransponderX2 message (#x2_CF) for PitEntry (3) and PitExit (18) are used for starting and stopping the PitTimer:

TrgCH	#X2_FC	0	1.000	0.0
TrgInVal	3	3	1.000	3.0
TrgOutVal	18	18	1.000	18.0

Documentation reference
For more information about Online Calculation channels and the complete PitTimer settings instructions please see the manual *Online Calculation channels* from our website
www.2D-Datarecording.com/manuals