

XAP-USERMANUAL-FOV4s SWPACK_1.7.6

Formula FOV4s



FORMULA Steering wheel

Modifications

Rel.	Date	Description	Author
1.0	30/07/2022	Document creation--Preliminary	DC-TP
1.1	30/09/2022	Update for SWPACK_1.1	DC
1.3	30/02/2023	UpDate for SWPACK_1.3	DC
1.3.1	06/04/2023	Add software upgrade information	DC
1.3.1	13/04/2023	FAQ information on Banner setup	DC
1.4.3	20/06/2023	Add program process, new items	DC
1.4.4	21/09/2023	Update from beta release	DC
1.7.1	14/10/2024	Update dash upgrade process	AB
1.7.2	19/11/2024	Mise a jour trame CAN // DE4	DC
1.7.5	30/06/2025	Activation licence	DC
1.7.6	30/08/2025	Add Dash application errors log, see FAQ	DC

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1 STEERING WHEEL ARCHITECTURE

1.1 Mechanical specification

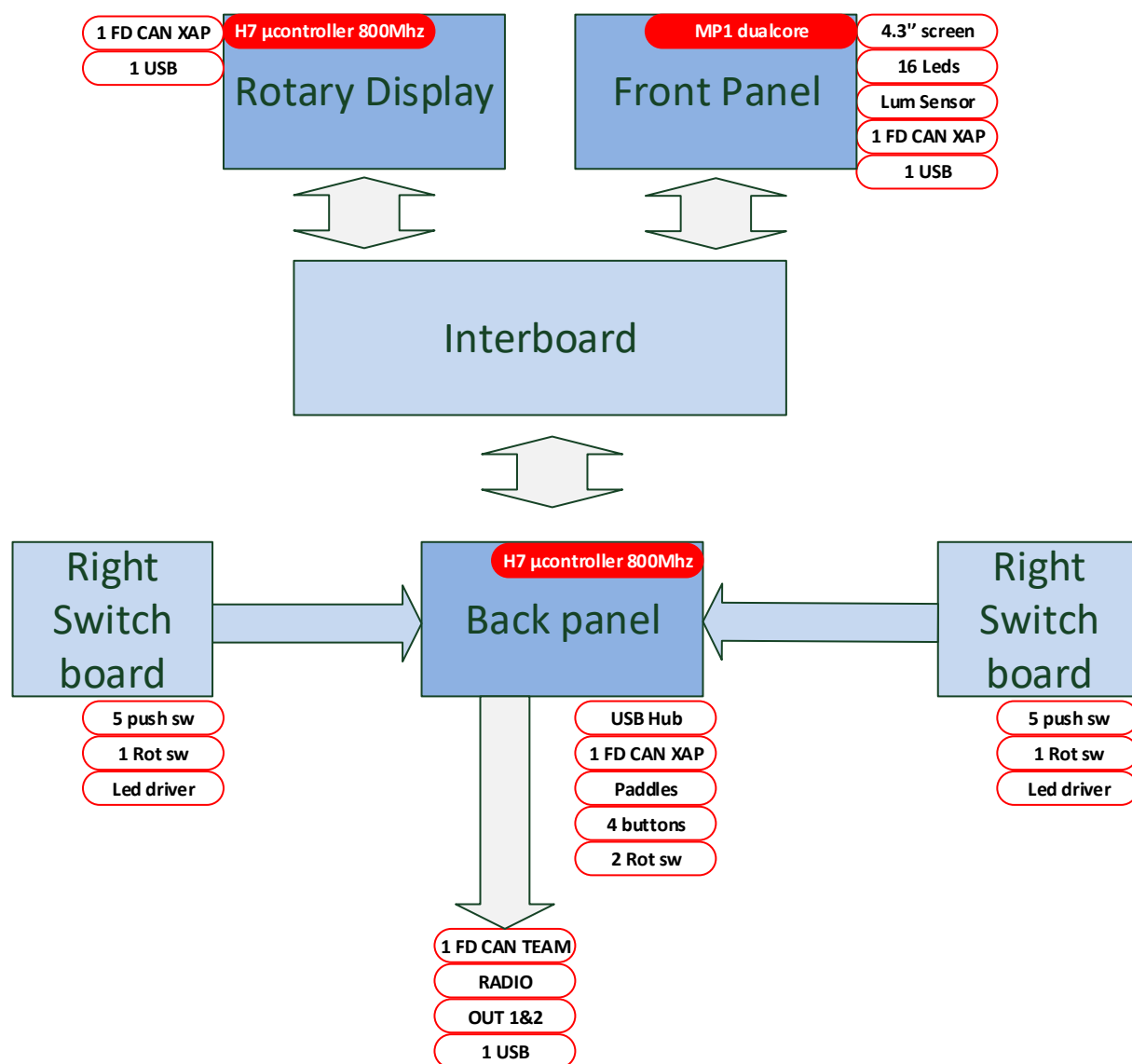


- Forged carbon for the entire structure of the steering wheel
- 2 hardware architectures available loop or
- 12 illuminated buttons, individually controlled by CAN
 - o Color is white
 - o Engraving is optional to avoid stickers, available on request (please ask us)
- 4 rotary switches, anodized in red
 - o Engraving is optional on request (please ask us)
- Up to 6 paddles (2 bottoms for clutch –extra displacement)
- 1 optocoupled outputs for the radio in/out (switch can be defined)
- 2 digital outputs are available (0-5V) (switch can be defined)
- 1 Rotary display
 - o 18 positions
 - o 1.2" round screen
 - o H7 550 Mhz μ controller (its own calculation)
 - o Fully independent (outputs: CAN FD + powersupply)

1.2 Electronic specification

1.2.1 Hardware

- Power supply **up to 60V**
- 3 μ controllers & 1 processor from ST microelectronics
- Back panel (steering) will concentrate the connection with the car system.



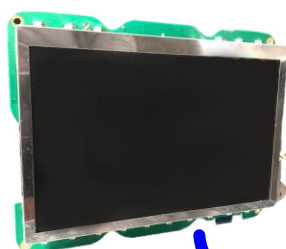
1.3 Communication architecture

1.3.1 CAN architecture

FOV4 is divided into 3 major modules: DASH, REAR and NT2R. Each module will be considered as individual, they got their own processor and memory. Below you will find the communication architecture:

CAN FD is used for internal CAN

DASH



NT2R



CAN 2 INTERNAL

REAR



CAN 1 EXTERNAL

IMPORTANT :

ALL DEFINED IDs RECEIVED ON CAN 1 ARE BRIDGED TO CAN 2

1.3.2 USB architecture

To reach each individual items, a USB hub has been integrated into the rear board. This can create a current consumption higher than it used to be. **So we highly recommend to use a USB hub with an external power supply** to avoid any voltage drop.

Here is our Hub used for developing.



D-Link DUB-H7 HUB USB Hub 7 Ports USB 2.0

1.4 Global characteristics

1.4.1 Software

Firmwares are defined as a package:

→ any dissociation of SWPACK release may create issues on behavior (PC tool included).

Display time has been optimized for standard booting (less than 7s), it might be longer while loading a new configuration.

Rear & NT2R will have shorter booting time.

1.4.2 Hardware

XAP platform dual core processor and microcontrollers architecture

- 32-bit dual-core Arm® Cortex®-A7 – L1 32-Kbyte I / 32-Kbyte D for each core – 256-Kbyte unified level 2 cache – Arm® NEON™ and Arm® TrustZone®
- 32-bit Arm® Cortex®-M4 with FPU/MPU – Up to 209 MHz (Up to 703 CoreMark®)
 - µcontroller for realtime
 - µprocessor dual core for:
 - background calculation
 - Graphic controller

The rotary display is defined as an independent device inside the steering wheel architecture, based on the H7 µcontroller, it has anything that a standard display has:

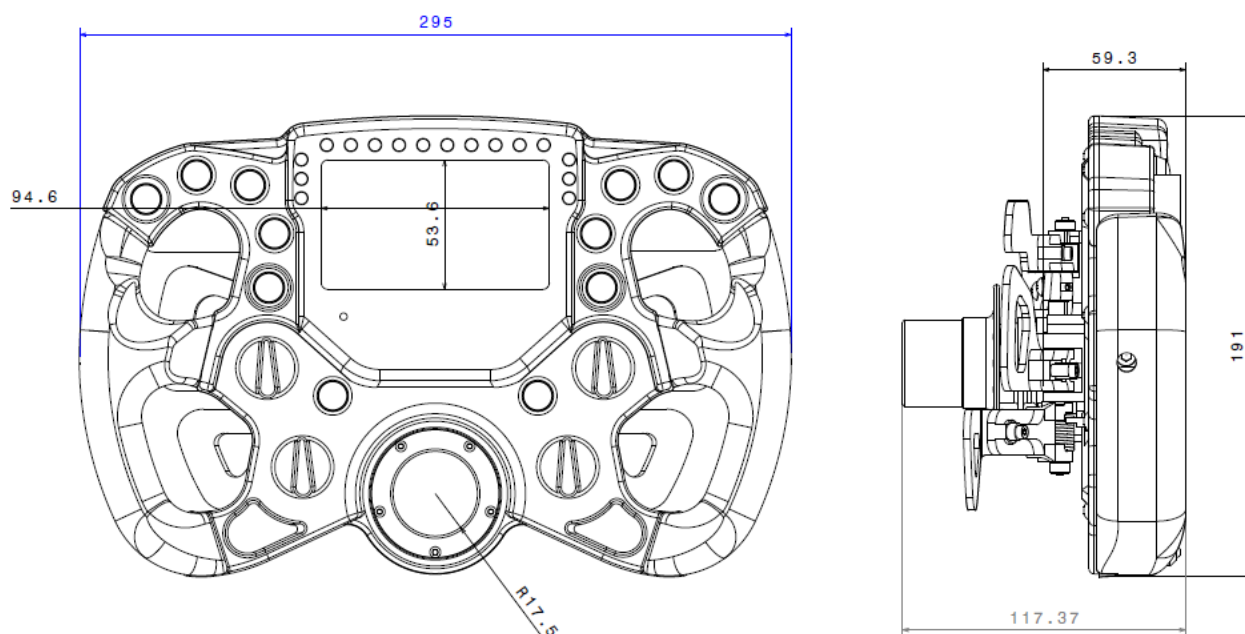
- Up to 30 screens available
- Embedded virtual channels
- CAN FD
- Import CAN, export available soon
- Switch on/off the screen
- No learning
- New on SWPACK 1.3:
 - Position Value return:
 - while running: keep the old value until a fix position is reached
 - at init: return 0 until a fix position is reached

1.5 Switches layout

FOV4S



1.6 Dimension



1.7 Pinout

To be confirmed

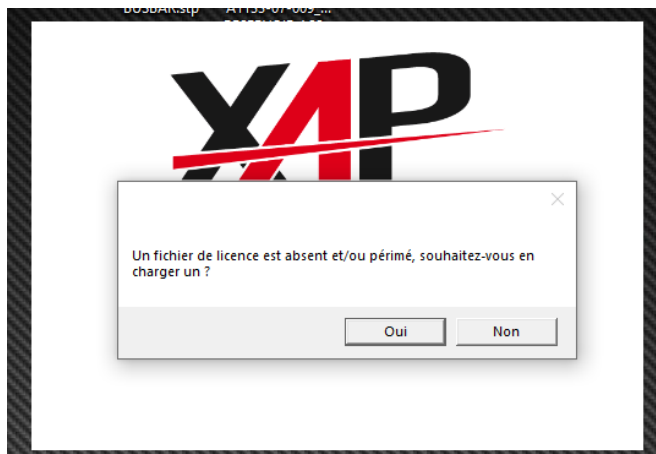
Connector pin	Function
Pin 1:	CAN Low
Pin 2:	CAN Hi
Pin 3:	USB Data -
Pin 4:	N/C
Pin 5:	N/C
Pin 6:	PTT in Internally Configurable, FE only
Pin 7:	PTT out
Pin 8:	OUT 2 Internally Configurable, FE only
Pin 9:	OUT 1 Internally Configurable, FE only
Pin 10:	VBatt
Pin 11:	Ground
Pin 12:	USB Power
Pin 13:	USB Data +

2 DASH EDITOR 4 EVOLUTIONS

2.1 License activation

A lic.xap file has been delivered with the SWPACK, please use it for activation of expert license

Click Yes on the license load request



Check level and date



2.2 Main Display evolution



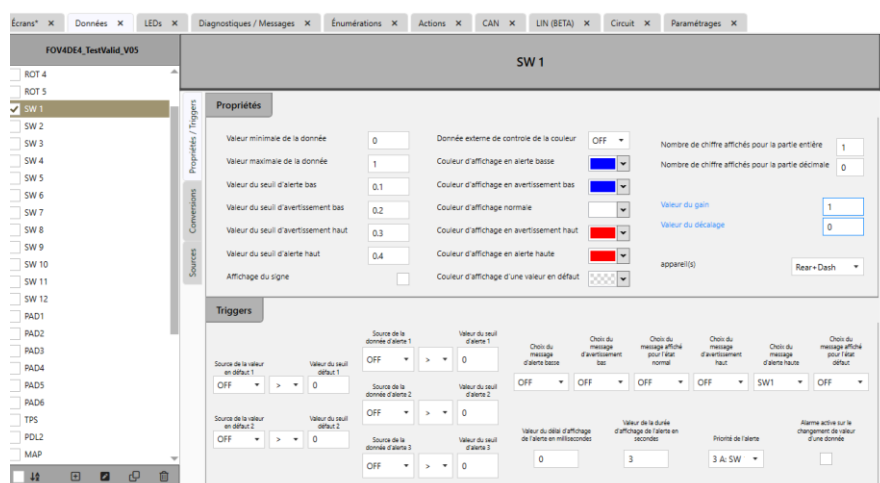
Common functions as save/save as/ add screen or return to previous are displayed with icons on the top bar.

The green area displays with tabs all setup available.

The blue area gives all items into the screen selected

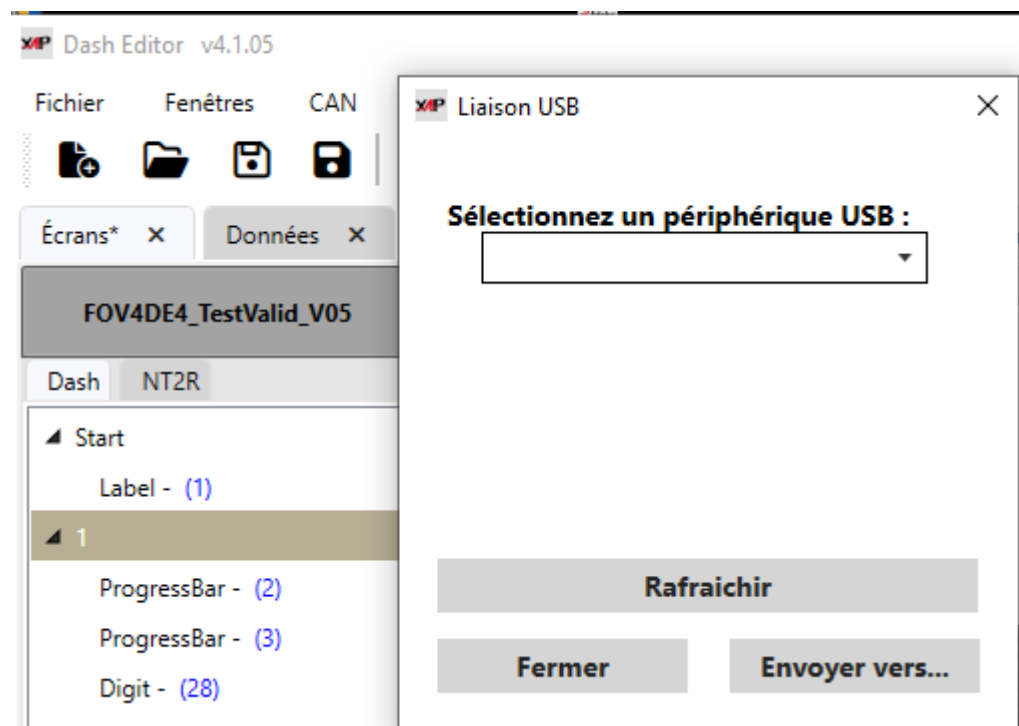
The orange area displays all items available through a drag and drop

Datas are displayed differently:



2.3 Programming display evolution

All boards will be shown as one to be programmed, see below



Refresh button is available to refresh XAP item available on USB

2.4 LIMIT

GLOBAL:

Channel character max :	16
First Character identical Max :	16
Group Led Max	32
Channel max (FOV4S)	400 (new for SWPACK 1.3)
Alert message max	250
Conversion Enumeration table	16
NBMAX_CANRXID	32
NBMAX_CANREQUEST	50
NBMAX_TABGEAR	20
NBMAX_FONTS	11
NBMAX_CHANNELPERCANID	254

Per Display (DASH or NT2R):

PROGBAR	200
BARGRAPH	200
GAUGE	200
NEEDLE	200
FRAME	200
DIGIT	500
LABEL	500
LOGO	200
MASK	500
SCREEN	30
BAR	30 //for gauge and bargraph
COMPONENT_PER_SCREEN	100

2.5 DataTable

The DataTable will be common to all configuration modules (Dash, steering, NT-2R).

1. Channel calculation and availability

Any channel can be individually defined to be available on specific module:

Users must pay attention in its calculation or the coherency of channel availability

The screenshot shows the configuration interface for 'SW 1'. It has two main tabs: 'Propriétés' and 'Triggers'.
Propriétés Tab:
 - Valeur minimale de la donnée: 0
 - Valeur maximale de la donnée: 1
 - Valeur du seuil d'alerte bas: 0.1
 - Valeur du seuil d'avertissement bas: 0.2
 - Valeur du seuil d'avertissement haut: 0.3
 - Valeur du seuil d'alerte haut: 0.4
 - Affichage du signe: ☐
 - Donnée externe de contrôle de la couleur: OFF
 - Couleur d'affichage en alerte basse: Blue
 - Couleur d'affichage en avertissement bas: Blue
 - Couleur d'affichage normale: White
 - Couleur d'affichage en avertissement haut: Red
 - Couleur d'affichage en alerte haute: Red
 - Couleur d'affichage d'une valeur en défaut: Checkered
 - Nombre de chiffre affichés pour la partie entière: 1
 - Nombre de chiffre affichés pour la partie décimale: 0
 - Valeur du gain: 1
 - Valeur du décalage: 0
 - appareil(s): Dropdown menu with options: ALL, Rear, Dash, NT2R, Rear+Dash (selected), Rear+NT2R, Dash+NT2R.
Triggers Tab:
 - Source de la valeur en défaut 1: OFF, Valeur du seuil défaut 1: 0
 - Source de la donnée d'alerte 1: OFF, Valeur du seuil d'alerte 1: 0
 - Source de la donnée d'alerte 2: OFF, Valeur du seuil d'alerte 2: 0
 - Source de la donnée d'alerte 3: OFF, Valeur du seuil d'alerte 3: 0
 - Choix du message d'avertissement bas: OFF
 - Choix du message d'avertissement haut: OFF
 - Choix du message affiché pour l'état normal: OFF
 - Valeur du délai d'affichage de l'alerte en millisecondes: 0
 - Valeur de la durée d'affichage de l'alerte en secondes: 3
 - Priorité de l'alerte: 3 A: SW
 - Alarme active sur le changement de valeur d'une donnée: ☐

2. New layout

SAVE/CANCEL tabs have appeared, the top right cross will only close without saving, CANCEL tab will require a confirmation before quit.

3. New option tab

Includes new features:

- Select all, edit will be available in multiple modification mod
- Unselect all

The screenshot shows a list box with the following items:
☐ PAD6
☐ TPS
☒ PDL2
☐ MAP
 Below the list box are several icons: a square with a downward arrow, a plus sign, a square with a diagonal line, a square with a checkmark, and a trash can icon.

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4. New multiple selection

More fields available in the multiple selection, what is not allow is blocked.

5. Channel naming

It was limited to the first 8 characters for naming, 16 is now available

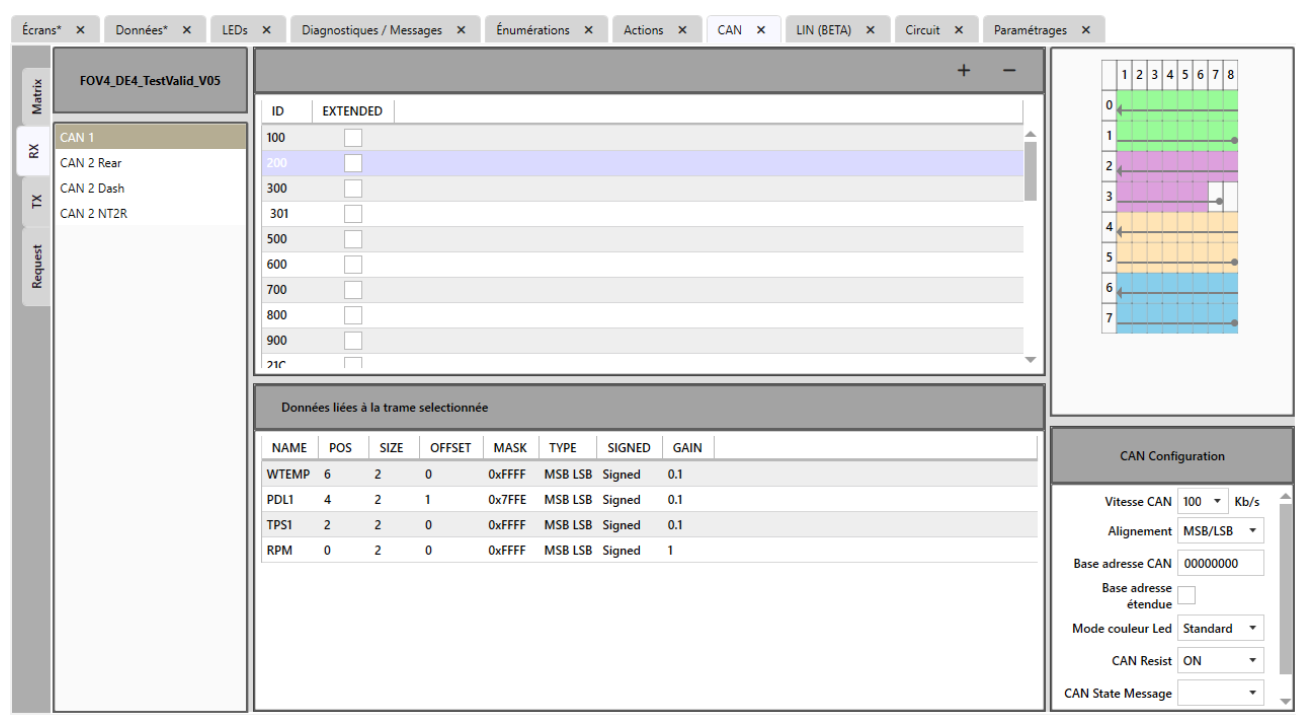
So the 16 first characters must be different from each other

6. Channel filtering

The filter is a low pass band, 1st order defined in Hz.

2.6 CAN SETUP

A new Tabs have been added, here below



1. CAN Matrix tab

This window will give an overview of your CAN configuration:

- IDs
- Which node will receive / transmit the ID

New on SWPACK 1.3:

Displays XAP CAN IDs

New on SWPACK 1.7.x Displays signal position and signal in IDs

2. CAN 2 Rear

Please note that right now any IDs received on CAN 1 will be automatically sent on CAN 2 by CAN2 Rear

3. CAN 2 node

Each node can be configured individually as before

Some settings cannot be configured as the speed or the termination for example.

4. CAN event (not for DASH)

Sending CAN id by event is available for REAR & NT2R with following function available:

- ID // Number of Frames // CAN Request

<http://www.xap.fr> - contact@xap.fr

2.7 DASHEDITOR ACTION

Actions has been increased by the numbers of modules

Action must be related to hardware location: Radio on rear board.

FOV4DE4_TestValid_V05

PAGE+;

Actions

Actions personnalisées

☒ PAGE+
 ☐ PAGE+
 ☐ PAGE+
 ☐ PAGE-
 ☐ PAGE-
 ☐ PAGE-
 ☐ CANCEL
 ☐ CANCEL
 ☐ CANCEL
 ☐ VALID
 ☐ VALID
 ☐ VALID
 ☐ ODO1 RESET
 ☐ ODO1 RESET
 ☐ ODO1 RESET
 ☐ ODO2 RESET
 ☐ ODO2 RESET
 ☐ ODO2 RESET
 ☐ ODO3 RESET
 ☐ ODO3 RESET
 ☐ ODO3 RESET

Canal

OFF

Opérateur

OFF_DATA

Mode d'action

ROT 1
 ROT 2
 ROT 3
 ROT 4
 ROT 5
 SW 1
 SW 2
 SW 3
 SW 4
 SW 5
 SW 6
 SW 7
 SW 8
 SW 9

Appareil

Seuil

0

Anti-rebond

0

Toggle

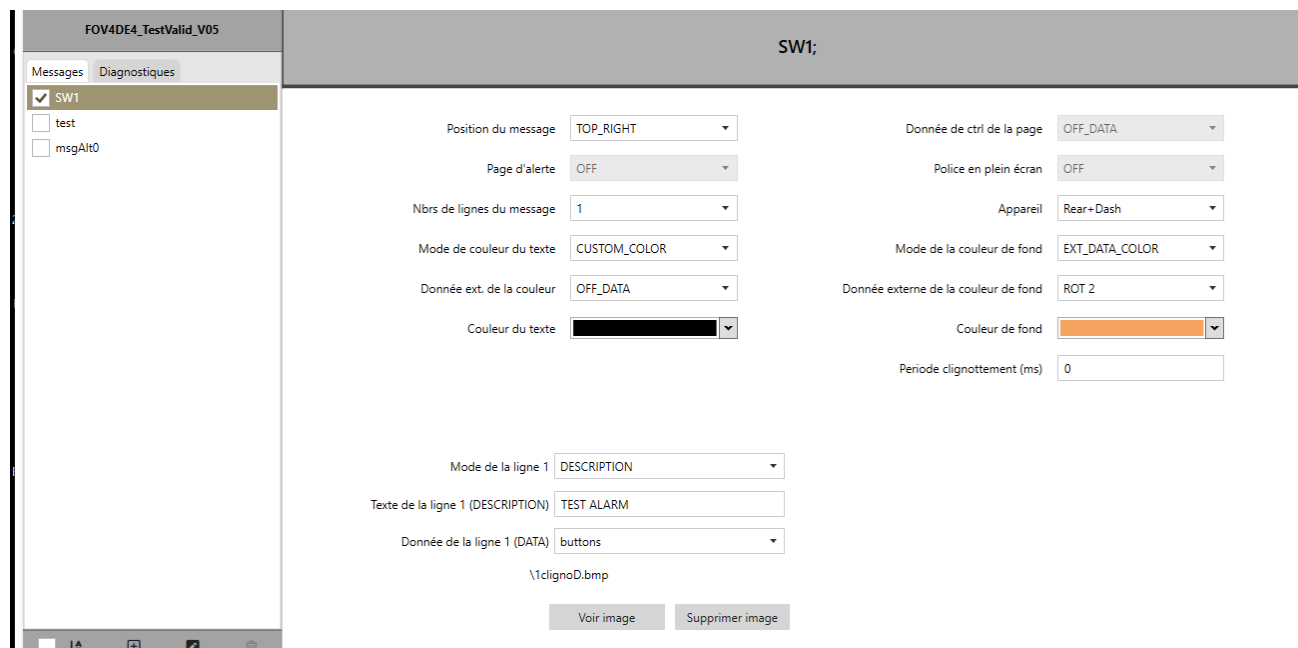
☒

2.8 MESSAGES/DIAGNOSTICS TABLE

Messages table has been modified to fit the new behavior (multi process)

Nb:

- Message defined as ALL will be displayed in all units if the channel is also defined as "ALL"
- Not available on NT2R Right now (coming up soon)



The screenshot shows a software configuration window titled "FOV4DE4_TestValid_V05". It has two tabs: "Messages" and "Diagnostics". The "Diagnostics" tab is active, showing a list of diagnostic messages on the left and configuration options on the right.

Diagnostic Messages List:

- ☒ SW1
- ☐ test
- ☐ msgAlt0

Configuration Options for SW1:

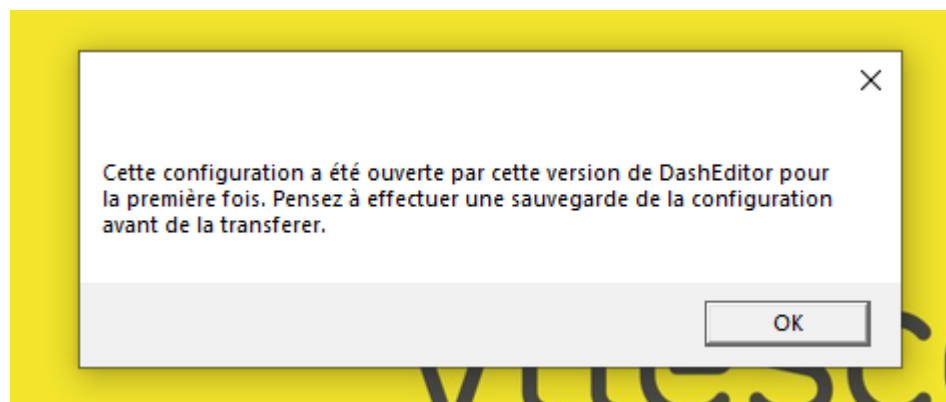
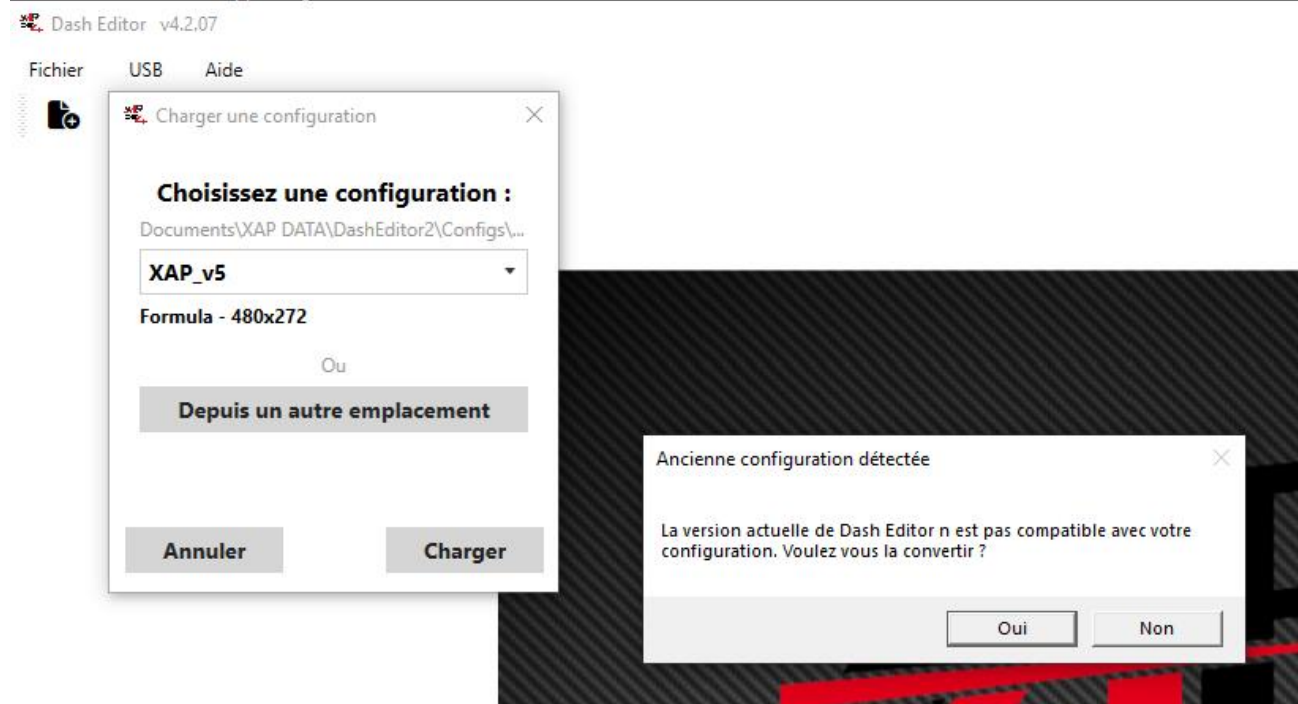
- Position du message: TOP_RIGHT
- Page d'alerte: OFF
- Nbrs de lignes du message: 1
- Mode de couleur du texte: CUSTOM_COLOR
- Donnée ext. de la couleur: OFF_DATA
- Couleur du texte: [Color Picker]
- Donnée de ctrl de la page: OFF_DATA
- Police en plein écran: OFF
- Appareil: Rear+Dash
- Mode de la couleur de fond: EXT_DATA_COLOR
- Donnée externe de la couleur de fond: ROT 2
- Couleur de fond: [Color Picker]
- Période clignotement (ms): 0
- Mode de la ligne 1: DESCRIPTION
- Texte de la ligne 1 (DESCRIPTION): TEST ALARM
- Donnée de la ligne 1 (DATA): buttons

At the bottom, there is a file path: \1clignoD.bmp and two buttons: "Voir image" and "Supprimer image".

Diagnostics have been added into the TAB with a sub tab (top right)

2.9 IMPORT FROM OLD DASHEDITOR

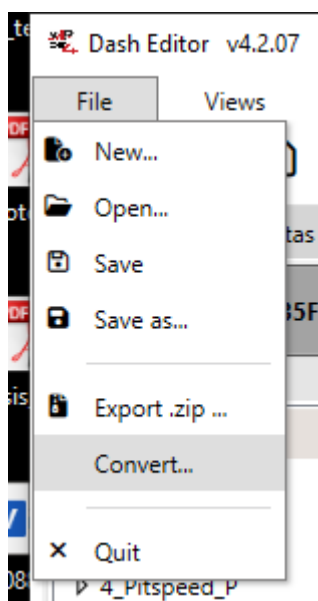
2.9.1 From older Dasheditor to new Dasheditor



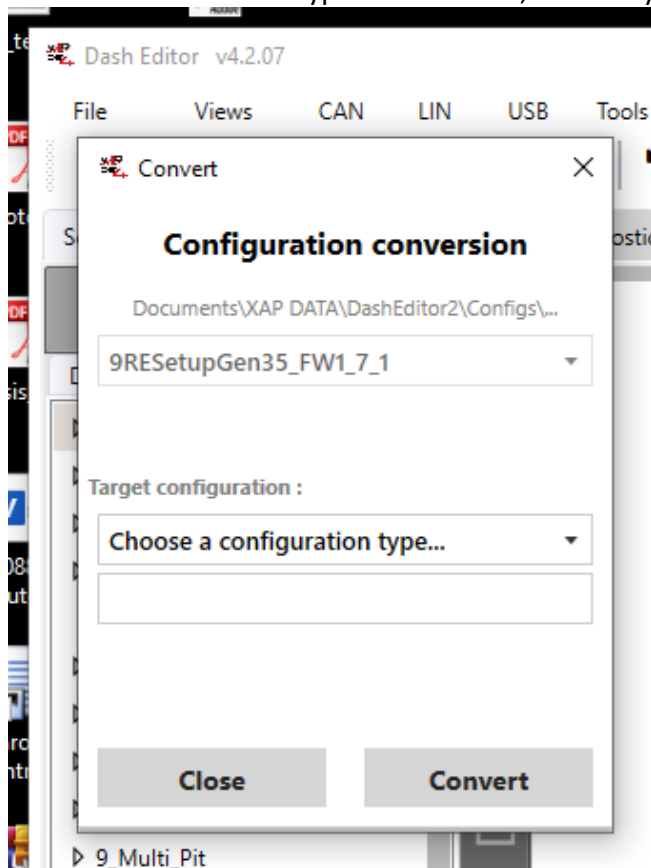
Then your configuration is set for DE3.6.x.x or higher with the same hardware.

2.9.2 From one Hardware to another

Select Configuration conversion

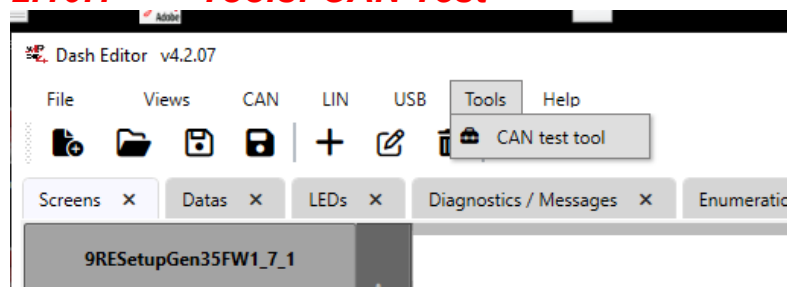


Then select in a list of type of hardware, the one you want to swap to. Formula E is FOV4S FE.



2.10 OPTION

2.10.1 Tools: CAN Test



Main Tab:

From all signals defined into Data Table, XAP CAN Test can replay to CAN through CAN.

Select your CAN interface/frequency then initialize.

The Signals list appears in which you can modify:

- Frequency
- Min/Max (firstly filled with Min/max from channel settings)
- Gain/Offset (firstly filled with Min/max from channel settings)
- Step
- Current value

One shot Send Values: send all data activated once

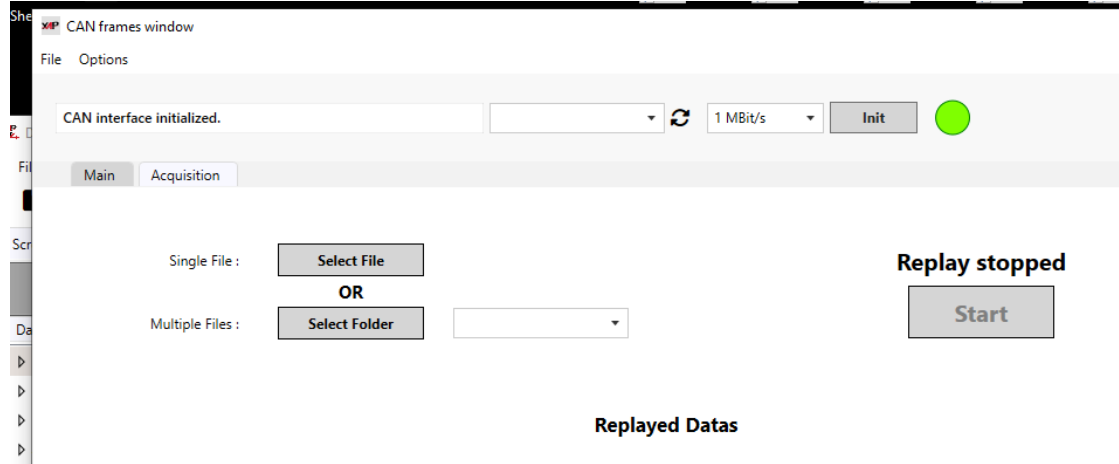
Start/Stop: Send values depending on Min/Max and step

Id	Frequency	
83	1	
85	1	
86	1	
87	1	
88	1	
89	1	
8A	1	
97	1	

Name	CAN ID	Min	Max	Gain	Offset	Step	Current Value	Activated
B0112VErrc	93	0	1	1	0	0	0	☐
B01BrakeEr	8A	0	1	1	0	0	0	☐
B01PWTRer	8A	0	1	1	0	0	0	☐
B01WDErrc	93	0	1	1	0	0	0	☐
B0212VErrc	93	0	1	1	0	0	0	☐
B02BrakeEr	8A	0	1	1	0	0	0	☐
B02PWTRer	8A	0	1	1	0	0	0	☐
B02WDErrc	93	0	1	1	0	0	0	☐

Acquisition Tab :

Replay from csv file, acquisition created with that configuration.



3 ANNEXE

3.1 Embedded software

1.1.1 Math Channels

1. *Arithmetic functions*

- Addition
- Substraction
- Mutiplication
- Division
- Priority with ()

2. *Logical functions*

IFBETWEEN(expression, rangeMin, rangeMax)

Returns 1 (TRUE) if the values of expression are included between the rangeMin and rangeMax. Returns 0 (FALSE) if values are external;

rangeMin and rangeMax can be single values or expression.

IFEQ(expression1, expression2, range)

Check whether an expression is equal to another; the second expression can be evaluated in a range.

Returns 1 (TRUE) if expressions are equal, 0 (FALSE) if the expressions are different.

Within range, returns true if (expression2-range) <= expression1 <= (expression2+range)

Remarks: If the parameter range is set to zero, the values of expression1 and expression2 are rounded to the number of decimal calculated for the **virtual** channel during the computation.

IFGE(expression1, expression2)

Returns 1 (TRUE) if expression1 is greater or equal than expression2; 0 (FALSE) if expression2 is greater than expression1.

Greater than or equal to, returns true if expression1 >= expression2

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IFGT(expression1, expression2)

Returns 1 (TRUE) if expression1 is greater than expression2; 0 (FALSE) if expression2 is greater than expression1.

Greater than or equal to, returns true if expression1 >=expression2

IFLE(expression1, expression2)

Returns 1 (TRUE) if expression2 is greater or equal than expression1; 0 (FALSE) if expression1 is greater than expression2.

Less than or equal to, returns true if expression1 <= expression2

IFLT(expression1, expression2)

Returns 1 (TRUE) if expression2 is greater than expression1; 0 (FALSE) if expression1 is greater than expression2.

Less than, returns true if expression1 <= expression2

IFNE(expression1, expression2, range)

Check whether an expression is different from another; the second expression can be evaluated in a range. Returns 1 (TRUE) if expressions are different, 0 (FALSE) if the expressions are equal.

Out of range, returns true if expression1 < (expression2-range); expression1 > (expression2+range)

Remarks: If the parameter range is set to zero, the values of expression1 and expression2 are rounded to the number of decimal calculated for the virtual channel during the computation.

NOT

The logical negation operator NOT returns the value 0 if its operand is nonzero and the value 1 if its operand is zero.

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3. *Logic functions*

AND

CANAL A & CANAL B → Retour 1

OR

CANAL A ou CANAL B → Retour 1

XOR

CANAL A ≠ CANAL B → Retour 1

bitNOT

CANAL A =0 → Retour 1

CANAL A =1 → Retour 0

bitAND

CANAL A & CANAL B → Return DATA with bit to 1 equal (new in SWPACK 1.4.4)

bitOR

CANAL A or CANAL B → Return DATA with bit to 1 or 0 (new in SWPACK 1.4.4)

Modulo

CANAL A modulo (new in SWPACK 1.4.4)

4. *Math functions*

abs(expression)

Absolute

Absolute value (or modulus) of expression. The result is the input expression without regard to its sign.

TimeInCondition

Function that gives the time of a true condition

Ex: TimeInCondition(overRevRPM) gives the time with RPM over threshold

5. State

if, else

Controls conditional branching. If the expression value is nonzero, statement1 is executed. If the optional else is present, statement2 is executed if the value of expression is zero.

Syntax:

```
If (expression)
{
    statement1;
}
else
{
    statement2;
}
```

BitAND & BitOR

Modulo

Return the remainder of the interger division between exp 1&2

6. Add in Data table

Create a data channel then into source, define it as a Virtual. Select your function to be used

The screenshot shows the 'Sources' tab in the XAP software. On the left, a sidebar contains 'Properties / T...', 'Conversions', 'Sources', and 'Comment'. The main area has a 'Data Source' dropdown set to 'VIRTUAL'. Below it, 'Virtual channel calculation frequency' is set to '20 Hz'. A 'Function list' dropdown is open, displaying a scrollable list of functions: CALC, IFBETWEEN, IFEQ, IFGE, IFGT, IFLE, IFLT, IFNEQ, NOT, AND, OR, XOR, bitNOT, Abs, TimeInCondition, and IfElse. To the right, 'Acquisition frequency value' is set to 'OFF' and 'Enumeratic' is also 'OFF'. Below these, there is a blue link 'Calculates expression 1' and an 'Expression 1' text box.

Properties / Triggers Conversions Sources ment			B12PWTR_Error	
			B13PWTR_Error	
			B14PWTR_Error	
			B15PWTR_Error	
			B16PWTR_Error	
			B17PWTR_Error	
			B18PWTR_Error	Enumeration source OFF
			B19PWTR_Error	
			B20PWTR_Error	
			B21PWTR_Error	
			B22PWTR_Error	
			B23PWTR_Error	
			B24PWTR_Error	

Properties / Triggers Conversions Sources ment	Data Source VIRTUAL	Function list : CALC IFBETWEEN IFEQ IFGE IFGT IFLE IFLT IFNEQ	Ac	Enumeration source OFF
Virtual channel calculation frequency 20 Hz				

1.1.2 XAP CAN PROTOCOL → SYSTEM

1. Frame 0x410 : General information

Basic Parameters

ID Hex (Dec)	Rate	Format
0x410(1040)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Software version	XAP_SOFT_V	U8 [1/bit]	
1	Running counter	XAP_CNT	U8 [1/bit]	Increments every frame
2	Light Sensor	XAP_LS	U12[1/bit]	12 bits conversion [0 – 4095]
3				
4	Current Page Number	XAP_STW_CURR_PN	U8[1/bit]	
5	Reset Source	XAP_RST_SOURCE	U8[1/bit]	See table below
6	Session Num		U8[1/bit]	
7				

Not used for FOV4s

RESET SOURCE

Value	Meaning
1	= Power Loss
2	= Pin reset Low
3	= Watchdog timeout

Nb:

Commercial serial number: it will display the value set into "User_sn.txt" located in REAR board

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2. *Frame 0x411 : Paddles 1,2,3 &4 ANA Values*

Basic Parameters

ID Hex (Dec)	Rate	Format
0x411(1041)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Paddle 1 ANA value	XAP_STW_PDL1	U12[1/bit]	12 bits conversion [0 – 4095]
1				
2	Paddle 2 ANA value	XAP_STW_PDL2	U12[1/bit]	12 bits conversion [0 – 4095]
3				
4	Paddle 3 ANA value	XAP_STW_PDL3	U12[1/bit]	12 bits conversion [0 – 4095]
5				
6	Paddle 4 ANA value	XAP_STW_PDL4	U12[1/bit]	12 bits conversion [0 – 4095]
7				

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3. *Frame 0x412 : Rotary and buttons*

Basic Parameters

ID Hex (Dec)	Rate	Format
0x412(1042)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Push Buttons & Paddles	XAP_STW_PB_PDLL	U16[bitmap]	See table below
1				
2	Rotary 1 position	XAP_STW_R1	U8[1/bit]	1 to 10, 0 if faulty position
3	Rotary 2 position	XAP_STW_R2	U8[1/bit]	1 to 18, 0 if faulty position
4	Rotary 3 position	XAP_STW_R3	U8[1/bit]	1 to 10, 0 if faulty position
5	Rotary 4 position	XAP_STW_R4	U8[1/bit]	1 to 8, 0 if faulty position
6	Rotary 5 position	XAP_STW_R5	U8[1/bit]	1 to 8, 0 if faulty position
7	Push Buttons & Output State	XAP_STW_OUTSTATE	U8[bitmap]	See Table below

Push buttons & Paddle switches Bitmap table

Bit	Meaning
0	=1 if Push Button 1 is pressed =0 if not
1	=1 if Push Button 2 is pressed =0 if not
2	=1 if Push Button 3 is pressed =0 if not
3	=1 if Push Button 4 is pressed =0 if not
4	=1 if Push Button 5 is pressed =0 if not
5	=1 if Push Button 6 is pressed =0 if not
6	=1 if Push Button 7 is pressed =0 if not
7	=1 if Push Button 8 is pressed =0 if not
8	=1 if Push Button 9 is pressed =0 if not
9	=1 if Push Button 10 is pressed =0 if not
10	=1 if Paddle 1 is pressed =0 if not
11	=1 if Paddle 2 is pressed =0 if not
12	=1 if Paddle 3 is pressed =0 if not
13	=1 if Paddle 4 is pressed =0 if not
14	=1 if Paddle 5 is pressed =0 if not
15	=1 if Paddle 6 is pressed =0 if not

Output State Bitmap table

Bit	Meaning
0	=1 if RADIO out is ON =0 if not
1	=1 if OUT1 out is ON =0 if not
2	=1 if OUT2 out is ON =0 if not
3	=1 if OUT3 out is ON =0 if not
4	=1 if Push Button 11 is pressed =0 if not
5	=1 if Push Button 12 is pressed =0 if not
6	unused
7	unused

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4. *Frame 0x413 : Paddles 5&6 ANA Values, 1&2 detection threshold*

Basic Parameters

ID Hex (Dec)	Rate	Format
0x413(1043)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Paddle 5 ANA value	XAP_STW_PDL5	U12[1/bit]	12 bits conversion [0 – 4095]
1				
2	Paddle 6 ANA value	XAP_STW_PDL6	U12[1/bit]	12 bits conversion [0 – 4095]
3				
4	Paddle 1 threshold	XAP_STW_PDL1	U12[1/bit]	12 bits conversion [0 – 4095]
5				
6	Paddle 2 threshold	XAP_STW_PDL2	U12[1/bit]	12 bits conversion [0 – 4095]
7				

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5. *Frame 0x414 : Paddles 3, 4, 5 & 6 detection threshold*

Basic Parameters

ID Hex (Dec)	Rate	Format
0x414(1044)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Paddle 3 threshold	XAP_STW_PDL3	U12[1/bit]	12 bits conversion [0 – 4095]
1				
2	Paddle 4 threshold	XAP_STW_PDL4	U12[1/bit]	12 bits conversion [0 – 4095]
3				
4	Paddle 5 threshold	XAP_STW_PDL5	U12[1/bit]	12 bits conversion [0 – 4095]
5				
6	Paddle 6 threshold	XAP_STW_PDL6	U12[1/bit]	12 bits conversion [0 – 4095]
7				

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6. *Frame 0x416: Rotary error count*

Basic Parameters

ID Hex (Dec)	Rate	Format
0x416(1046)	100 Hz	

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Rotary 1 error count	XAP_ROT1_ERROR_CNT	U16[1/bit]	
1				
2	Rotary 3 error count	XAP_ROT3_ERROR_CNT	U16[1/bit]	
3				
4	Rotary 4 error count	XAP_ROT4_ERROR_CNT	U16[1/bit]	
5				
6	Rotary 5 error count	XAP_ROT5_ERROR_CNT	U16[1/bit]	
7				

7. Frame 0x417/418/419: Diagnostic

0x417:Rear panel

0x418:Dash panel

0x419:NT2R

Basic Parameters

ID Hex (Dec)	Rate	Format
0x417(1047)	100 Hz	Big Endian
0x418(1048)	100 Hz	Big Endian
0x419(1049)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	INIT DIAG	INIT DIAG	U8[bitmap]	See table below
1	CPU LOAD	CPU_LOAD	U8[1/bit]	Cpu load %
2	Reset Source	RST_SOURCE	U8[1/bit]	See table below
3	Extended Version	EXT_VERSION	U16[1/bit]	Firmware extended version
4				
5	CAN Error Counter	CAN_ERROR_CNT	U16[1/bit]	CAN Error Counter
6				
7	Running Counter	CNT	U8[1/bit]	

INIT DIAG BITMAP

Bit	Meaning 417h	Meaning 418h	Meaning 419h
0	= EEPROM Inititalized	= EEPROM Inititalized	UNUSED
1	= EMMC Inititalized	= EMMC Inititalized	= EMMC Inititalized
2	UNUSED	= LCD Inititalized	= LCD Inititalized
3	= LED Initialized	= LED Initialized	UNUSED
4	= Push Buttons Inititalized	= Push Buttons Inititalized	UNUSED
5	= Paddles Inititalized	UNUSED	UNUSED
6	= Rotary Inititalized	UNUSED	= Rotary Inititalized
7	UNUSED	UNUSED	UNUSED

RESET SOURCE

Value	Meaning
1	= Power Loss
2	= Pin reset Low
3	= Watchdog timeout

1.1.3 AP CAN PROTOCOL → SYSTEM

Behavior of the LED frames:

- If there is a LED order (another value than 0 on RGB LED values)
 - The specified LED will be forced by RGB values in the frame
- If there is no LED order (0 on the RGB LED values)
 - The specified LED will have the “**DASH EDITOR**” behavior

1. Frame 0x400: LED spec & dimming

Basic Parameters

ID Hex (Dec)	Rate	Format
0x400 (1024)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 0 RED Value	LED_0_R	U8	
1	LED 0 GREEN Value	LED_0_G	U8	
2	LED 0 BLUE Value	LED_0_B	U8	
3	LED 1 RED Value	LED_1_R	U8	
4	LED 1 GREEN Value	LED_1_G	U8	
5	LED 1 BLUE Value	LED_1_B	U8	
6	LED Push Buttons	LED_PB	U16	Bit0 to Bit11 : PB1 to PB12 led state, Bit12 to Bit15 unused
7				

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1.1.3.1.1 LED 2&3

Basic Parameters

ID Hex (Dec)	Rate	Format
0x401(1025)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 2 RED Value	LED_2_R	U8	
1	LED 2 GREEN Value	LED_2_G	U8	
2	LED 2 BLUE Value	LED_2_B	U8	
3	LED 3 RED Value	LED_3_R	U8	
4	LED 3 GREEN Value	LED_3_G	U8	
5	LED 3 BLUE Value	LED_3_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

2. LED 4&5

Basic Parameters

ID Hex (Dec)	Rate	Format
0x402(1026)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 4 RED Value	LED_4_R	U8	
1	LED 4 GREEN Value	LED_4_G	U8	
2	LED 4 BLUE Value	LED_4_B	U8	
3	LED 5 RED Value	LED_5_R	U8	
4	LED 5 GREEN Value	LED_5_G	U8	
5	LED 5 BLUE Value	LED_5_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

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3. LED 6&7

Basic Parameters

ID Hex (Dec)	Rate	Format
0x403(1027)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 6 RED Value	LED_6_R	U8	
1	LED 6 GREEN Value	LED_6_G	U8	
2	LED 6 BLUE Value	LED_6_B	U8	
3	LED 7 RED Value	LED_7_R	U8	
4	LED 7 GREEN Value	LED_7_G	U8	
5	LED 7 BLUE Value	LED_7_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

4. LED 8&9

Basic Parameters

ID Hex (Dec)	Rate	Format
0x404(1028)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 8 RED Value	LED_8_R	U8	
1	LED 8 GREEN Value	LED_8_G	U8	
2	LED 8 BLUE Value	LED_8_B	U8	
3	LED 9 RED Value	LED_9_R	U8	
4	LED 9 GREEN Value	LED_9_G	U8	
5	LED 9 BLUE Value	LED_9_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

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5. LED 10&11

Basic Parameters

ID Hex (Dec)	Rate	Format
0x405(1029)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 10 RED Value	LED_10_R	U8	
1	LED 10 GREEN Value	LED_10_G	U8	
2	LED 10 BLUE Value	LED_10_B	U8	
3	LED 11 RED Value	LED_11_R	U8	
4	LED 11 GREEN Value	LED_11_G	U8	
5	LED 11 BLUE Value	LED_11_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

6. LED 12&13

Basic Parameters

ID Hex (Dec)	Rate	Format
0x406(1030)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 12 RED Value	LED_12_R	U8	
1	LED 12 GREEN Value	LED_12_G	U8	
2	LED 12 BLUE Value	LED_12_B	U8	
3	LED 13 RED Value	LED_13_R	U8	
4	LED 13 GREEN Value	LED_13_G	U8	
5	LED 13 BLUE Value	LED_13_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

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7. LED 14&15

Basic Parameters

ID Hex (Dec)	Rate	Format
0x407 (1031)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	LED 14 RED Value	LED_14_R	U8	
1	LED 14 GREEN Value	LED_14_G	U8	
2	LED 14 BLUE Value	LED_14_B	U8	
3	LED 15 RED Value	LED_15_R	U8	
4	LED 15 GREEN Value	LED_15_G	U8	
5	LED 15 BLUE Value	LED_15_B	U8	
6	NA	NA	NA	
7	NA	NA	NA	

8. Backlight & LED Dimming

Basic Parameters

ID Hex (Dec)	Rate	Format
0x408(1032)	100 Hz	Big Endian

Detailed Payload Description: available is xapcan is set in your configuration

Byte	STW Name	External Name	Calibration	Notes
0	Screen backlight Dimming Dash and NT2R	SCR_BL_DIM	U8	8 light levels (0 : max, 8 mini)
1	Led Dimming	LED_DIM	U8	8 light levels (0 : max, 8 mini)
2	Push Buttons Led Dimming	PB_LED_DIM	U8	4 light levels (0 : max, 4 mini)
3	NA	NA	NA	
4	NA	NA	NA	
5	NA	NA	NA	
6	NA	NA	NA	

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7	NA	NA	NA	
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3.1.1 Frame 0x409 : Page specification & button

Basic Parameters

ID Hex (Dec)	Rate	Format
0x409(1033)	100 Hz	Big Endian

Detailed Payload Description

Byte	STW Name	External Name	Calibration	Notes
0	Page control screen 1	PG_CTRL_1	U8	DASH 0: page driven by DashEditor settings 1 – 255: Requested automatic page 1 : Page n°1 255 : page n°255
1	button N° OUT1 OUT2	NUM_BTN_CMD_1_2	U8	See “button choice” below
2	button N° Page+ radio	NUM_BTN_PG+_RAD	U8	See “button choice” below
3	button N° Page-	NUM_BTN_PG-	U8	See “button choice” below
4	Page Control screen 2	PG_CTRL_2	U8	NT2R 0: page driven by DashEditor settings 1 – 255: Requested automatic page 1 : Page n°1 255 : page n°255
5				
6				
7	button N° Start Training (only for F2)	NUM_BTN_ST	U8	Number between 1 & 10 0 = INACTIVE

Button choice in frame 0x409

Byte	BIT	FUNCTION	Notes
1	0-3	OUT1 button choice	Number between 1 & 12 Warning: The button will not be affected if that button is already taken. 0 = INACTIVE NOT AVAILABLE FOR FORMULA E
	4-7	OUT2 button choice	
2	0-3	Page+ button choice	
	4-7	Radio button choice	
3	0-3	Page- button choice	
	4-7	Set to 0	

3.1.2 Frame 0x415 : All LEDs Configuration

Basic Parameters

ID Hex (Dec)	Rate	Format
0x415(1045)	100 Hz	

Detailed Payload Description

Bit	STW Name	External Name	Calibration	Notes
0	LED 0 RED Status	LED_0_R	Boolean	0 = OFF / 1 = ON
1	LED 0 GREEN Status	LED_0_G	Boolean	0 = OFF / 1 = ON
2	LED 0 BLUE Status	LED_0_B	Boolean	0 = OFF / 1 = ON
3	LED 1 RED Status	LED_1_R	Boolean	0 = OFF / 1 = ON
4	LED 1 GREEN Status	LED_1_G	Boolean	0 = OFF / 1 = ON
5	LED 1 BLUE Status	LED_1_B	Boolean	0 = OFF / 1 = ON
6	LED 2 RED Status	LED_2_R	Boolean	0 = OFF / 1 = ON
7	LED 2 GREEN Status	LED_2_G	Boolean	0 = OFF / 1 = ON
8	LED 2 BLUE Status	LED_2_B	Boolean	0 = OFF / 1 = ON
9	LED 3 RED Status	LED_3_R	Boolean	0 = OFF / 1 = ON
10	LED 3 GREEN Status	LED_3_G	Boolean	0 = OFF / 1 = ON
11	LED 3 BLUE Status	LED_3_B	Boolean	0 = OFF / 1 = ON
12	LED 4 RED Status	LED_4_R	Boolean	0 = OFF / 1 = ON
13	LED 4 GREEN Status	LED_4_G	Boolean	0 = OFF / 1 = ON
14	LED 4 BLUE Status	LED_4_B	Boolean	0 = OFF / 1 = ON
15	LED 5 RED Status	LED_5_R	Boolean	0 = OFF / 1 = ON
16	LED 5 GREEN Status	LED_5_G	Boolean	0 = OFF / 1 = ON
17	LED 5 BLUE Status	LED_5_B	Boolean	0 = OFF / 1 = ON
18	LED 6 RED Status	LED_6_R	Boolean	0 = OFF / 1 = ON
19	LED 6 GREEN Status	LED_6_G	Boolean	0 = OFF / 1 = ON
20	LED 6 BLUE Status	LED_6_B	Boolean	0 = OFF / 1 = ON
21	LED 7 RED Status	LED_7_R	Boolean	0 = OFF / 1 = ON

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22	LED 7 GREEN Status	LED_7_G	Boolean	0 = OFF / 1 = ON
23	LED 7 BLUE Status	LED_7_B	Boolean	0 = OFF / 1 = ON
24	LED 8 RED Status	LED_8_R	Boolean	0 = OFF / 1 = ON
25	LED 8 GREEN Status	LED_8_G	Boolean	0 = OFF / 1 = ON
26	LED 8 BLUE Status	LED_8_B	Boolean	0 = OFF / 1 = ON
27	LED 9 RED Status	LED_9_R	Boolean	0 = OFF / 1 = ON
28	LED 9 GREEN Status	LED_9_G	Boolean	0 = OFF / 1 = ON
29	LED 9 BLUE Status	LED_9_B	Boolean	0 = OFF / 1 = ON
30	LED 10 RED Status	LED_10_R	Boolean	0 = OFF / 1 = ON
31	LED 10 GREEN Status	LED_10_G	Boolean	0 = OFF / 1 = ON
32	LED 10 BLUE Status	LED_10_B	Boolean	0 = OFF / 1 = ON
33	LED 11 RED Status	LED_11_R	Boolean	0 = OFF / 1 = ON
34	LED 11 GREEN Status	LED_11_G	Boolean	0 = OFF / 1 = ON
35	LED 11 BLUE Status	LED_11_B	Boolean	0 = OFF / 1 = ON
36	LED 12 RED Status	LED_12_R	Boolean	0 = OFF / 1 = ON
37	LED 12 GREEN Status	LED_12_G	Boolean	0 = OFF / 1 = ON
38	LED 12 BLUE Status	LED_12_B	Boolean	0 = OFF / 1 = ON
39	LED 13 RED Status	LED_13_R	Boolean	0 = OFF / 1 = ON
40	LED 13 GREEN Status	LED_13_G	Boolean	0 = OFF / 1 = ON
41	LED 13 BLUE Status	LED_13_B	Boolean	0 = OFF / 1 = ON
42	LED 14 RED Status	LED_14_R	Boolean	0 = OFF / 1 = ON
43	LED 14 GREEN Status	LED_14_G	Boolean	0 = OFF / 1 = ON
44	LED 14 BLUE Status	LED_14_B	Boolean	0 = OFF / 1 = ON
45	LED 15 RED Status	LED_15_R	Boolean	0 = OFF / 1 = ON
46	LED 15 GREEN Status	LED_15_G	Boolean	0 = OFF / 1 = ON
47	LED 15 BLUE Status	LED_15_B	Boolean	0 = OFF / 1 = ON
48	LED PB 1 Status	LED_PB_1	Boolean	0 = OFF / 1 = ON
49	LED PB 2 Status	LED_PB_2	Boolean	0 = OFF / 1 = ON
50	LED PB 3 Status	LED_PB_3	Boolean	0 = OFF / 1 = ON
51	LED PB 4 Status	LED_PB_4	Boolean	0 = OFF / 1 = ON
52	LED PB 5 Status	LED_PB_5	Boolean	0 = OFF / 1 = ON
53	LED PB 6 Status	LED_PB_6	Boolean	0 = OFF / 1 = ON
54	LED PB 7 Status	LED_PB_7	Boolean	0 = OFF / 1 = ON
55	LED PB 8 Status	LED_PB_8	Boolean	0 = OFF / 1 = ON
56	LED PB 9 Status	LED_PB_9	Boolean	0 = OFF / 1 = ON
57	LED PB 10 Status	LED_PB_10	Boolean	0 = OFF / 1 = ON
58	LED PB 11 Status	LED_PB_11	Boolean	0 = OFF / 1 = ON
59	LED PB 12 Status	LED_PB_12	Boolean	0 = OFF / 1 = ON
60	NA	NA	NA	
61	NA	NA	NA	
62	NA	NA	NA	
63	NA	NA	NA	

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3.2 DashEditor

Some options may not be available due to FIA regulation

- Button selection functions are not available from CAN Radio, Out1 and 2. Users must use “action table” in Dasheditor menu to do so.

3.3 Hardware

- OUT 1 and OUT 2 are available for FOV4S (FORMULA E)
 - o Out1 & 2 are defined on Rear board
- Radio is defined on REAR board
 - o Radio defined on Rear board
- New Pack1.1:
 - o The four rotary switches are not available for change when a rear paddle is pulled.
 - o ~~Led compact management not available.~~

4 SOFTWARE UPGRADE PROCESS

4.1 On board upgrade Process

The steering wheel even if it is composed of 3 elements is defined as one. So the whole software package cannot be load separately.

A delivery of software pack will be given to customer as follow:

SWPACK_1.0

SWPACK_1.1

And so on.

Steering wheel must power up before plug USB in, then 3 drives will be created by windows and must be named as follow:

DASHDRIVE (F:)

ROTADRIVE (G:)

ARRDRIVE (H:)

And steering wheel will be :



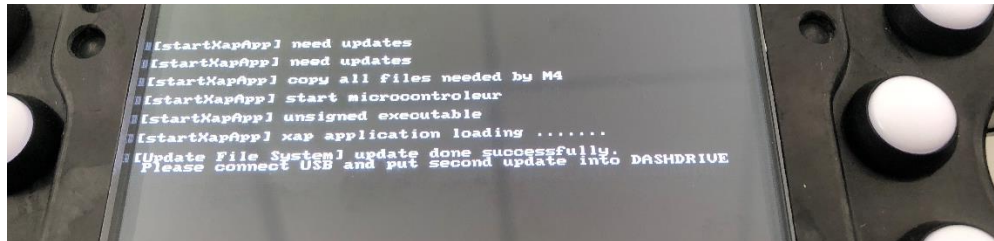
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Below a description of the process will be detailed

Nb: You can update your configuration with DashEditor during this operation.

First, to make sure you do have any corrupt file, you will remove all files into each USB drive, then

- Connect the STW to your laptop, once all the 3 drives are there, remove all files from the DASH drives, keep only the update folders in the 2 other drives
- Disconnect USB
- Do a Powercycle
- Reconnect USB
- Copy/paste the firmwares in Update folder (ARR & ROT) and for Dash drive copy **Update1** folder + the attached file in the root of Dash
- Disconnect Usb
- Wait for the screen below



- copy **Update2** folder + the attached file in the root of Dashdrive
- disconnect USB
- Wait for few seconds
- Power cycle
- Wait for no config
- Connect USB
- Load the config
- Disconnect USB
- Wait for page 1 to popup
- Powercycle

Detailed process for each board are detailed in the following.

4.1.1 Dash Drive

The dash drive will concern the board with the screen and MP1 processor

From the SWPACK_x.x, go to Dash folder -> Update 1 and copy all folders and files available to DASHDRIVE

NB: Files available depends on modification done

See below

S20 D105 - VOLANTS > XAP_FORMULA_FOV4S_2022 > Livraison_PackSoft > SWPACK_1_7_2 > EMBEDDED > Da:				
	Nom	Modifié le	Type	Taille
★	Update 1	19/11/2024 10:53	Dossier de fichiers	
★	Update 2	19/11/2024 10:53	Dossier de fichiers	
★				
★				
★				
★				

Then unplug USB and wait for system rebooting.

After the system rebooting plug USB again.

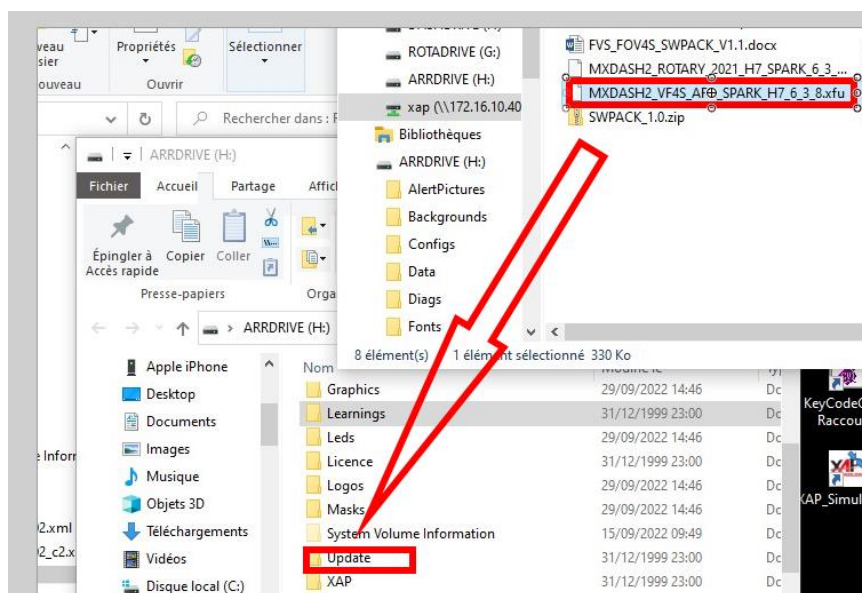
From the SWPACK_x.x, go to Dash folder -> Update 2 and copy all folders and files available to DASHDRIVE

NB: Files available depend on modification done

4.1.2 ARRDRIIVE

This element will have a different behavior since it is a μ controller only

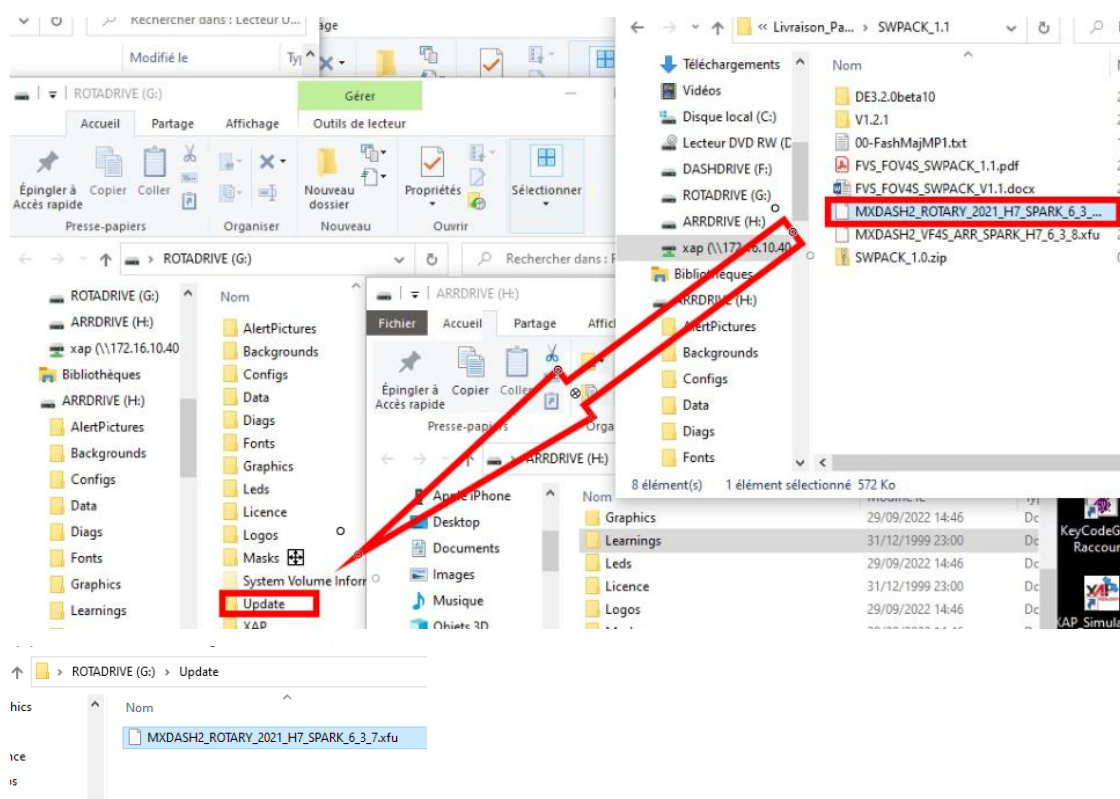
So to upgrade copy XFU file defined for the element ARR into Update folder, as follow:



4.1.3 ROTADRIIVE

This element will have a different behavior since it is a μ controller only.

So to upgrade copy XFU file defined for the element ROTARY into Update folder, as follow:



4.1.4 Final Upgrade Process

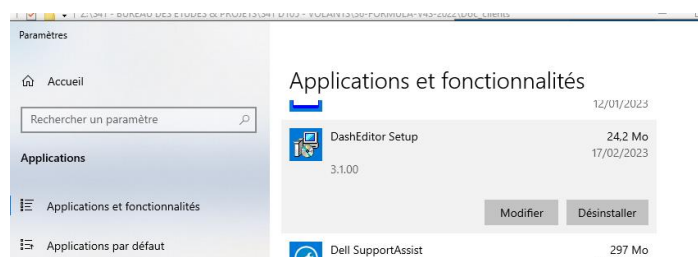
To start the upgrade process of FOV4S, you just need to disconnect the USB NT2R (Rotary) and Back panel (ARR) will be quickly upgraded.
DASH will take several second to be upgraded, try not power off during this process.



Please note that a power cycle will be needed at the end of the upgrade.

4.2 Dasheditor upgrade Process

Before installing a new release of Dasheditor, you need to remove the old one installed



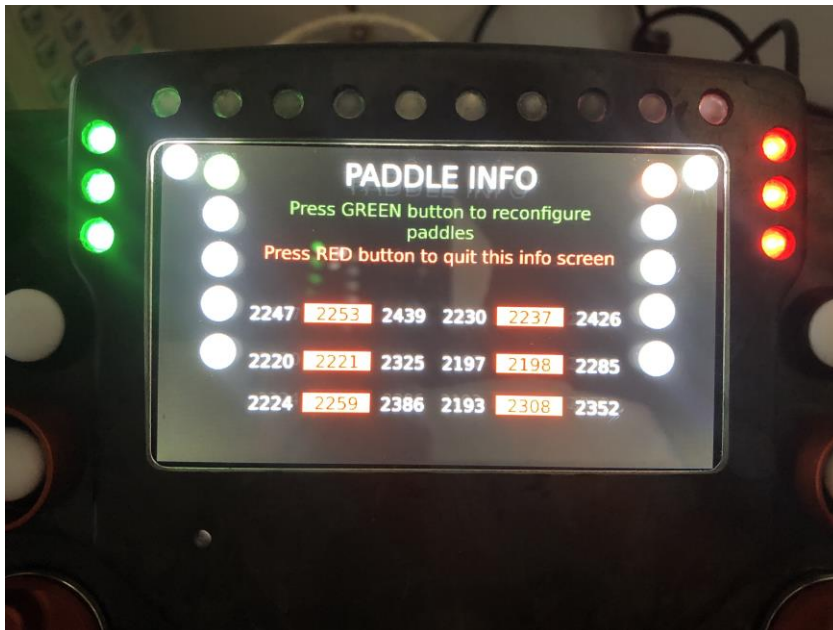
Then you can start the install process of the new dash editor

5 LEARNING PROCESS



5.1 Paddles

To start the process, press push buttons 1 & 10 few second while powering up
 Pushbutton light will stay off except buttons 2 and 9, and led lights will appear :see picture below



Then follow screen instruction, first 4 upper paddles then clutch paddles.

5.2 Rotary switches

To start the process, press push buttons 3 & 8 few second while powering up

Pushbutton light will stay off except buttons 2 and 9, and led lights will appear: see picture below and follow instructions.



As soon as you validate to do learnings, the yellow circle will surround the selected rotary switches.

This will be done in 2 steps, first will be the upper rotary switches then the bottom ones.

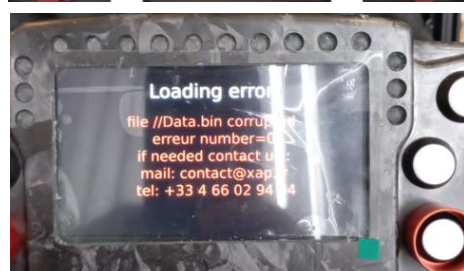
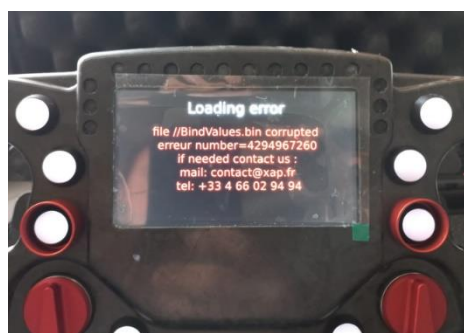
6 TROUBLESHOOTING

6.1 FAQ

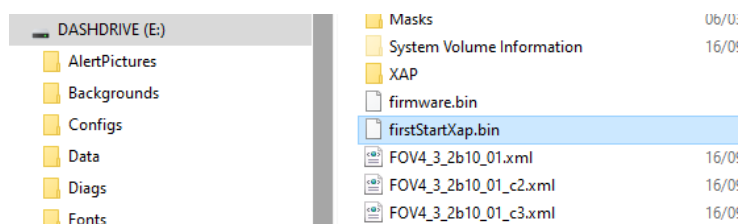
- What is the reason if my data is replaced by OFFDATA:
 - This will appear when you send your configuration to steeringwheel and incoherency is seen

Ex: if you define a data as rear and want to display on screen, this must be defined as Rear+dash at least.

- What should I do if my screen displays error message after sending SCREEN displays:



- Remove on DashDrive firstStartXAP.bin
This will load the configuration as the first time.



- Why my USB drive taking so long:
 - All USB drives are mounted by sequence to avoid any Windows® management issue
 - Start with ROTA drive and finish with DASH drive
 - A message saying that USB drive
- Why USB is showing Over current message
 - The information of the current has not been included into the driver, so current appears high that it should, there is no consequences on your USB port.
- Why a banner will not appear:
 - Messages setup should have the same setting as the data linked.

If a message is set to appear on DASH only then the data in which the message is used should be set as DASH also.

TABLE DES MESSAGES													
	Name	Edit	Del	Device	Pos	DestPage	DataPage	Nb Lines	L1 Mode	L1 Img	View L1	L1 text	
0	SW1	☐	Edit	Del	Dash	MIDDLE	OFF	OFF	1	DESC	Add	View	TEST ALARM
1	test	☐	Edit	Del	Dash	TOP	OFF	OFF	1	DESC	Add	View	

SW 1	☐	Edit	Del	0	1	Dash	0						
SW 2	☐	Edit	Del	0	1	All	0						
SW 3	☐	Edit	Del	0	1	All	0						
SW 4	☐	Edit	Del	0	1	All	0						
SW 5	☐	Edit	Del	0	1	All	0						
SW 6	☐	Edit	Del	0	1	All	0						
SW 7	☐	Edit	Del	0	1	All	0						
SW 8	☐	Edit	Del	0	1	All	0						
SW 9	☐	Edit	Del	0	1	All	0						

Source de la donnée d'alerte 1	Valeur du seuil d'alerte 1	Source de la donnée d'alerte 2	Valeur du seuil d'alerte 2	Source de la donnée d'alerte 3	Valeur du seuil d'alerte 3
OFF	> 0	OFF	> 0	OFF	> 0

Choix du message d'alerte basse	Choix du message d'avertissement bas	Choix du message affiché pour l'état normal	Choix du message d'avertissement haut	Choix du message d'alerte haute	Choix du message affiché pour l'état défaut
OFF	OFF	OFF	OFF	SW1	OFF

Valeur du délai d'affichage de l'alerte en millisecondes	Valeur de la durée d'affichage de l'alerte en secondes	Priorité de l'alerte	Alarme active sur le changement de valeur d'une donnée
0	0	4 A: SW	☐



This is also true for Diagnostic setup.

- All rotary values are 0 on 0x412:
 - Paddles learnings have been done ?
- Why in low luminosity some leds stays OFF:
 - The luminosity depends on the current apply, following on the color chosen, some currents are not enough to light the led.

- Why not all ascii values are displayed:
 - o Here are the ascii value allowed:

dec	hex	oct	char	dec	hex	oct	char	dec	hex	oct	char	dec	hex	oct	char
0	0	000	NULL	32	20	040	space	64	40	100	@	96	60	140	.
1	1	001	SOH	33	21	041	!	65	41	101	A	97	61	141	a
2	2	002	STX	34	22	042	"	66	42	102	B	98	62	142	b
3	3	003	ETX	35	23	043	#	67	43	103	C	99	63	143	c
4	4	004	EOT	36	24	044	\$	68	44	104	D	100	64	144	d
5	5	005	ENQ	37	25	045	%	69	45	105	E	101	65	145	e
6	6	006	ACK	38	26	046	&	70	46	106	F	102	66	146	f
7	7	007	BEL	39	27	047	'	71	47	107	G	103	67	147	g
8	8	010	BS	40	28	050	(	72	48	110	H	104	68	150	h
9	9	011	TAB	41	29	051	)	73	49	111	I	105	69	151	i
10	a	012	LF	42	2a	052	*	74	4a	112	J	106	6a	152	j
11	b	013	VT	43	2b	053	+	75	4b	113	K	107	6b	153	k
12	c	014	FF	44	2c	054	,	76	4c	114	L	108	6c	154	l
13	d	015	CR	45	2d	055	-	77	4d	115	M	109	6d	155	m
14	e	016	SO	46	2e	056	.	78	4e	116	N	110	6e	156	n
15	f	017	SI	47	2f	057	/	79	4f	117	O	111	6f	157	o
16	10	020	DLE	48	30	060	0	80	50	120	P	112	70	160	p
17	11	021	DC1	49	31	061	1	81	51	121	Q	113	71	161	q
18	12	022	DC2	50	32	062	2	82	52	122	R	114	72	162	r
19	13	023	DC3	51	33	063	3	83	53	123	S	115	73	163	s
20	14	024	DC4	52	34	064	4	84	54	124	T	116	74	164	t
21	15	025	NAK	53	35	065	5	85	55	125	U	117	75	165	u
22	16	026	SYN	54	36	066	6	86	56	126	V	118	76	166	v
23	17	027	ETB	55	37	067	7	87	57	127	W	119	77	167	w
24	18	030	CAN	56	38	070	8	88	58	130	X	120	78	170	x
25	19	031	EM	57	39	071	9	89	59	131	Y	121	79	171	y
26	1a	032	SUB	58	3a	072	:	90	5a	132	Z	122	7a	172	z
27	1b	033	ESC	59	3b	073	;	91	5b	133	[	123	7b	173	{
28	1c	034	FS	60	3c	074	<	92	5c	134	\	124	7c	174	
29	1d	035	GS	61	3d	075	=	93	5d	135	]	125	7d	175	}
30	1e	036	RS	62	3e	076	>	94	5e	136	^	126	7e	176	~
31	1f	037	US	63	3f	077	?	95	5f	137	_	127	7f	177	DEL

Plus : + - * / % < = >

- Wrong format will display no characters.
- o Check the connector tolerance.
 - 10.6 to 11mm



- What do I do if the screen is freezing and/or resetting by itself
 - o Check the folder as below and send to XAP for further analysis.

Application Error watcher:

To know exactly what is going on if dash is freezing or reset without watchdog information, an application Error watcher has been implemented. A new folder has been created into DashDRIVE.

Err_ → Log from system Information from system
 Log_ → Log from Application Information from application
 Out_ → Warning from application Information from application

