JeeHell A320 FMGS Advanced User Guide

Version B54.x

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1. Introduction

The JeeHell A320 Software suite is a complete freeware set simulating, in Microsoft Flight Simulator® or Lockheed Martin Prepar3D, the FMGS (Flight Management & Guidance System) as well as most electronic instruments of the Airbus A320.

If you have any questions or remarks, you can contact be by email (jeehell ≪ at ≫ jeehell.org), or through ☞ **mycockpit.org** forums (in English) or ☞ **aircockpit.com** forums (in French).

The guide you are currently reading relates to optional/supplementary setup actions that can be made, regarding software or hardware interactions with JeeHell A320 Software.

This guide assumes all JeeHell A320 Software modules are already installed and tested (Installation Guide) and used successfully on at least one flight (User Guide).

DISCLAIMER:

- This software is by no means related to Airbus, EADS or any affiliated group. It is intended to use only as a recreational software together with Microsoft Flight Simulator. Do not use as a part of training toward any kind or aeronautical certification, be it private pilot or commercial pilot training.
- This software should cause no harm to your computer. In the very unlikely event damage occurred to your system, I won't take any liability. Use at your own risk.
- **The use and distribution of this software in any professional environment is prohibited without a proper license. Check the License.txt file to know what are the rights you have with this version.**

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2. Issues with Frame Rates

It has already been said in the first pages of the **Installation Guide**: JeeHell A320 Software is made to be networked.

A sample architecture was described, which is stable and made of PC dedicated to FSX/P3D and the FMGS Server, while the other applications are distributed on other computers (depending on user setup, money, etc…).

All configurations of course are not tested…

2.1 - FSX issues

Even on latest hardcore gaming computers, FSX may still be eating all the CPU. The way FSX was written, with single core computers, means the bottleneck is more FSX itself than the computer.

P3D may be an alternative, as it might be using Computer resources in a better way. JeeHell A320 Software works seamlessly with Prepar3D, however **remember JeeHell A320 Software is no longer compatible with FS9.**

2.2 - Add-ons

FSX/P3D can be enhanced with many third party add-ons (Weather, live traffic, sceneries, ATC, etc...).

Caution : some of these add-ons are also **VERY** CPU hungry (particularly some sceneries) and will make the FSX/P3D frame rates (FPS) drop.

The FPS can be displayed with the « SHIFT + Z » key combination.

Tutorials to fine tune performance, and software as well, are available on Internet. It is up to every one to make his own tests and decide what is best for his setup.

Remember, below 25 fps, the simulator may start to misbehave (systems, autopilot etc...).

3. Networking issues

If you need to change the networking parameters that were set during installation, either run the « configure.exe » application again or look in the *WideFMGS* subfolder for the file named *wideFMGS.ini*, which contains the following data:

```
[widefmgs]
ip=192.168.1.10
fsip=192.168.1.11
port=8003
port2=8004
port3=8005
port4=8006
```

IP field:

- Must contain the IP address of the computer running Server FMGS (here 192.168.1.10).
- If all software are on the same PC, you can leave« localhost », or 127.0.0.1.

FSIP field:

- Must contain the IP address of the computer running P3D/FSX (here 192.168.1.11).

Port numbers :

- I suggest you leave the default ports. However, in case of conflict you can of course change these.
- If you make any changes, you then must do the **same modifications** on **ALL** your computers, this includes the IP addresses and the port numbers.

Remember:

- « FMGS Server and AP/FBW » module is *preferentially* installed on the computer running FSX/P3D.Since version B46, it is possible to install these modules on another computer to help save performance, but here is not much feedback on the performance gain and stability.
- The « FSUIPC Support » modules is also *preferentially* installed on the PC running FSX / P3D. it can be run on another computer which must then have WideFS running.

4. Additional settings

4.1 - Sounds

The « SOUND » module plays back the cockpit sounds (not the aerodynamic or egnines sounds). It can be networked so that the sound outputs from your FSX/P3D is not a limiting factor.

You are free to replace all the « .wav » files you find, so you have different GPWS or TCAS sounds (maybe taken from real recordings). However, take care to keep the same file names and the same number of files. If you wish to remove a sound, you disable it in the « SOUND » module options.

4.2 - Starter module

The « Starter.exe » module is on each computer at the installation root (by default « A320FMGS ») ; it is easily recognized with its little plane icon.

On the computer running the FMGS_Server, you can use either « Starter.exe » or « StarterENGRUN.exe » (see the Installation Guide chapter 5.1).

The « Starter » launches and closes quickly all the necessary applications, and also external applications you want to run along the software.

It is configured during installation, depending on your installation choices. You can later modify the list of applications to run (though if you want to run applications not previously installed, you will need to run the installer package again) by modifying the “starter.ini” file:

```
[Starter]
FMGS_Server=yes
OVHD=yes
FCU=yes
MCDU=yes
FO_MCDU=yes
PFD=yes
ND=yes
EWD=yes
SD=yes
Sound=yes
FO_PFD=yes
FO_EFIS=yes
FO_ND=yes
```

```
TripleBRK=yes
STBY_ASI=yes
STBY_AltiFt=yes
STBY_AltiM=yes
STBY_Horizon=yes
DDRMI=yes
Clock=yes
ISIS=yes

HardwareConnect=yes
wideFMGS=no
wideFMGSserver=yes

AUTOclose=yes
StartMinimized=yes
Autosave=no

//ExtProg.0=c:\windows\notepad.exe
Intercom=yes
softFlaps=yes
softSpoilers=yes
softTHRLVRs=yes
softGEAR=yes
SoftACP1=yes
SoftACP2=yes
SoftACP3=yes
SoftECP=yes
```

Each line is related to a specific module (or group of modules which need to run on the same computer). If you select « yes », then that module will run automatically when launching Starter.exe. If you select « no », it will not run… Of course you need to save the changes in that file before running the starter !

AUTOclose option set to “yes” (by default) makes the starter close all opened application when closing down the starter. Set « no » if you prefer to close the software manually by yourself.

StartMinimized option makes the Starter.exe go directly in the task bar, minimized.

As previously said, the Starter can also run external applications. You can run up to 256 of them. To do so, you have to add lines in the format : ExtProg.X=Path, where X is a number for the order of launch, starting from 0.

- As an example, you can run FSX and notepad (only useful for an example…) :
  - ExtProg.0=c:\games\FSX.exe
  - ExtProg.1=c:\windows\notepad.exe
- You need to number the applications from 0. If you miss an iteration, the applications after the « jump » will not open.

The modules « softFlaps », « SoftSpoilers » etc..., are new applications since B46 corresponding to software versions of panels such as ACPs, thrust levers, flaps…

5. FSUIPC

The software is compatible with FSUIPC from Peter Dowson/ (to date, FSUIPC4 4.96).

- The list of offsets used by my software may change anytime, without any link to FSUIPC version.
- You need to know how to change only single bits of an offset for some functions.

If you do not need/use FSUIPC offsets to interface with the FMGS software, you can simply delete FSUIPCmodule.dll in the « Hardware Modules » folder on the FSX/P3D computer.

The latest offset list :

OFFSET	LENGTH (bytes)	FUNCTION	
7390	**1**	**Read bits to get LED status**	
		0	AP1
		1	AP2
		2	A/THR
		3	APPR
		4	LOC
		5	EXPED
		6	HDG-VS mode if set to 0, TRK-FPA mode if set to 1
		7	Speed mode SPD if set to 0, MACH if set to 1
7391	**1**	**Read bits to get LED status**	
		0	SPD DOT
		1	LAT DOT
		2	ALT DOT
		3	CPT STD if set to 1
		4	CPT QNH if set to 0; QFE if set to 1
		5	CPT LS
		6	CPT FD
		7	CPT CSTR
7392	**1**	**Read bits to get LED status**	
		0	CPT WPT
		1	CPT VOR
		2	CPT NDB
		3	CPT ARPT
		4	FO STD if set to 1
		5	FO QNH if set to 0; FO QFE if set to 1
		6	FO LS
		7	FO FD
7393	**1**	**Read bits to get LED status**	
		0	FO CSTR
		1	FO WPT

OFFSET	LENGTH (bytes)	FUNCTION	
		2	FO VOR
		3	FO NDB
		4	FO ARPT
		5	Auto-Brake DECEL
		6	Auto-Brake LO
		7	Auto-Brake MED
7394	**1**	**Read bits to get LED status**	
		0	Auto-Brake MAX
		1	ECP DOOR
		2	ECP ENG
		3	ECP BLEED
		4	ECP CAB PRESS
		5	ECP ELEC
		6	ECP HYD
		7	ECP FUEL
7395	**1**	**Read bits to get LED status**	
		0	ECP APU
		1	ECP COND
		2	ECP WHEEL
		3	ECP F/CTL
		4	ECP CLR
		5	ECP STS
		6	MW
		7	MC
7396	**1**	**Read bits to get LED status**	
		0	GALLEY SHED FAULT
		1	GALLEY SHED OFF
		2	BAT1 FAULT
		3	BAT1 OFF
		4	BAT2 FAULT

OFFSET	LENGTH (bytes)	FUNCTION	
		5	BAT2 OFF
		6	AC ESS FEED FAULT
		7	AC ESS FEED ALTN
7397	**1**	**Read bits to get LED status**	
		0	ELEC GEN1 FAULT
		1	ELEC GEN1 OFF
		2	ELEC GEN2 FAULT
		3	ELEC GEN2 OFF
		4	ELEC APU GEN FAULT
		5	ELEC APU GEN OFF
		6	BUS TIE OFF
		7	ELEC EXT PWR AVAIL
7398	**1**	**Read bits to get LED status**	
		0	ELEC EXT PWR ON
		1	RAT&EMER GEN FAULT
		2	Réservé
		3	GPWS SYS FAULT
		4	GPWS SYS OFF
		5	GPWS G/S OFF
		6	GPWS FLAP OFF
		7	GPWS LDG FLAP3 ON
7399	**1**	**Read bits to get LED status**	
		0	PACK1 FAULT
		1	PACK1 OFF
		2	PACK2 FAULT
		3	PACK2 OFF
		4	ENG1 BLEED FAULT
		5	ENG1 BLEED OFF
		6	ENG2 BLEED FAULT
		7	ENG2 BLEED OFF

OFFSET	LENGTH (bytes)	FUNCTION	
739A	**1**	**Read bits to get LED status**	
		0	BACKLIGHT POWER ON/OFF
		1	RAM AIR ON
		2	APU BLEED FAULT
		3	APU BLEED ON
		4	WINDOWS/PROBE HEAT ON
		5	HOT AIR FAULT
		6	HOT AIR OFF
		7	WING AI FAULT
739B	**1**	**Read bits to get LED status**	
		0	WING AI ON
		1	ENG1 AI FAULT
		2	ENG1 AI ON
		3	ENG2 AI FAULT
		4	ENG2 AI ON
		5	CAB PRESS MODE FAULT
		6	CAB PRESS MODE MAN
		7	DITCHING ON
739C	**1**	**Read bits to get LED status**	
		0	APU MASTER FAULT
		1	APU MASTER ON
		2	APU START AVAIL
		3	APU START ON
		4	FWD ISOL VALVE FAULT
		5	FWD ISOL VALVE OFF
		6	AFT ISOL VALVE FAULT
		7	AFT ISOL VALVE OFF
739D	**1**	**Read bits to get LED status**	
		0	CARGO HOT AIR FAULT
		1	CARGO HOT AIR OFF

OFFSET	LENGTH (bytes)	FUNCTION	
		2	ENG1 MAN START ON
		3	ENG2 MAN START ON
		4	ENG1 HYD PUMP FAULT
		5	ENG1 HYD PUMP OFF
		6	ENG2 HYD PUMP FAULT
		7	ENG2 HYD PUMP OFF
739E	**1**	**Read bits to get LED status**	
		0	BLUE ELEC PUMP FAULT
		1	BLUE ELEC PUMP OFF
		2	PTU FAULT
		3	PTU OFF
		4	YELLOW ELEC PUMP FAULT
		5	YELLOW ELEC PUMP ON
		6	FUEL XFEED OPEN
		7	FUEL XFEED ON
739F	**1**	**Read bits to get LED status**	
		0	LTK1 FAULT
		1	LTK1 OFF
		2	LTK2 FAULT
		3	LTK2 OFF
		4	RTK1 FAULT
		5	RTK1 OFF
		6	RTK2 FAULT
		7	RTK2 OFF
73A0	**1**	**Read bits to get LED status**	
		0	CTK1 FAULT
		1	CTK1 OFF
		2	CTK2 FAULT
		3	CTK2 OFF
		4	FUEL MODE SEL FAULT

OFFSET	LENGTH (bytes)	FUNCTION	
		5	FUEL MODE SEL MAN
		6	ADR1 FAULT
		7	ADR1 OFF
73A1	**1**	**Read bits to get LED status**	
		0	ADR2 FAULT
		1	ADR2 OFF
		2	ADR3 FAULT
		3	ADR3 OFF
		4	ADIRU1 FAULT
		5	ADIRU1 ALIGN
		6	ADIRU2 FAULT
		7	ADIRU2 ALIGN
73A2	**1**	**Read bits to get LED status**	
		0	ADIRU3 FAULT
		1	ADIRU3 ALIGN
		2	ON BAT
		3	ELAC1FAULT
		4	ELAC1 OFF
		5	ELAC2 FAULT
		6	ELAC2 OFF
		7	SEC1 FAULT
73A3	**1**	**Read bits to get LED status**	
		0	SEC1 OFF
		1	SEC2 FAULT
		2	SEC2 OFF
		3	SEC3 FAULT
		4	SEC3 OFF
		5	FAC1 FAULT
		6	FAC1 OFF
		7	FAC2 FAULT

OFFSET	LENGTH (bytes)	FUNCTION	
73A4	**1**	**Read bits to get LED status**	
		0	FAC2 OFF
		1	IDG1 FAULT
		2	IDG2 FAULT
		3	AUTOLAND
		4	ENG1 FIRE HANDLE
		5	ENG2 FIRE HANDLE
		6	APU FIRE HANDLE
		7	ENG1 AGENT1 SQUIB
73A5	**2**	Reserved for Datalink addon by C. Paulus.	
73A7	**1**	Triple Brake Indicator ACCU Pressure (0-255)	
73A8	**1**	Triple Brake Indicator Left Brake (0-255)	
73A9	**1**	Triple Brake Indicator Right Brake (0-255)	
73AA	**1**	**Read bits to get LED status**	
		0	ENG1 AGENT1 DISCH
		1	ENG1 AGENT2 SQUIB
		2	ENG1 AGENT2 DISCH
		3	ENG2 AGENT1 SQUIB
		4	ENG2 AGENT1 DISCH
		5	ENG2 AGENT2 SQUIB
		6	ENG2 AGENT2 DISCH
		7	APU AGENT SQUIB
73AB	**1**	**Read bits to get LED status**	
		0	APU AGENT DISCH
		1	GPWS TERR FAULT
		2	GPWS TERR OFF
		3	CPT TERR ON ND ON
		4	FO TERR ON ND ON
		5	GPWS alert indicator
		6	GPWS G/S alert indicator

OFFSET	LENGTH (bytes)	FUNCTION	
		7	CPT Priority Arrow
73AC	**1**	**Read bits to get LED status**	
		0	CPT Priority CPT
		1	FO Priority Arrow
		2	FO Priority FO
		3	BRK FAN ON
		4	BRK FAN HOT
		5	ENG1 START FIRE
		6	ENG2 START FIRE
		7	ENG1 START FAULT
73AD	**1**	**Read bits to get LED status**	
		0	ENG2 START FAULT
		1	EMER SIGNS OFF
		2	EMER CALL/ON (both leds of the korry come together)
		3	EVAC COMMAND panel EVAC/ON lights (both leds come together)
		4	MAIN ELEC POWER
		5	LEFT LDG GEAR UNLOCK
		6	NOSE LDG GEAR UNLOCK
		7	RIGHT LDG GEAR UNLOCK
73AE	**2**	Trim wheel position requested : • If not in manual mode, in degrees *100 (so varying between -400 and +1350). If in manual mode, this reads -9999. • See also offset 78E9.	
73B0	**1**	Reserved for Datalink addon by C. Paulus.	
73B1	**2**	Rudder trim display value * 10. • Right is positive, left negative. • If dashes are displayed, value is 999. • If display is OFF, value is 777.	
73B3		**Read bits to get LED status**	
		0	LEFT LDG GEAR DOWNLOCKED
		1	NOSE LDG GEAR DOWNLOCKED
		2	RIGHT LDG GEAR DOWNLOCKED
		3	SEAT BELTS SIGN

R
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OFFSET	LENGTH (bytes)	FUNCTION	
		4	NO SMOKING SIGN
73B4 à 73BB	**10**	**Reserved for future usage**	
73BC	**2**	BAT1 Voltage *10.	
73BE	**2**	BAT2 Voltage *10.	
73C0	**1**	**FMGS Flight phase. Read value**	
		0	None
		1	Preflight
		2	Take-Off
		3	Climb
		4	Cruise
		5	Descent
		6	Approach
		7	Go Around
73C1	**2**	• SPD value in kts or mach value in (mach)*100 • -999 when display dashed • 888 if in LED Test mode	
73C3	**2**	• HDG/TRK value in degrees • -999 when display dashed • 888 if in LED Test mode	
73C5	**2**	• ALT value in (feet)/100 • 8888 if in LED Test mode	
73C7	**1**	• V/S in (ft/mn)/100 or FPA in (degrees)*10 • -127 when display dashed • -126 if in LED Test mode	
73C8	**2**	• CPT QNH Display. If value is below 1100 then unit is mb. Otherwise, value is (QNH in inHg)*100 • STD is -999 • 8888 if in LED Test mode	
73CA	**2**	• FO QNH Display. If value is below 1100 then unit is mb. Otherwise, value is (QNH in inHg)*100 • STD is -999 • 8888 if in LED Test mode	
73CC	**1**	**Select data pipe function (see offset 73CD)**	
		0	None
		1	SPD/Mach
		2	HDG/TRK
		3	ALT
		4	VS (format is ft/min) / FPA (format is FPA x10)

OFFSET	LENGTH (bytes)	FUNCTION	
		5	CPT QNH
		6	FO QNH
		7	LDG ELEV
		8	Cockpit TEMP
		9	FWD Cabin TEMP
		10	AFT cabin TEMP
		11	FWD Cargo TEMP
		12	AFT Cargo TEMP
		13	Trim wheel Threshold degrees*100 : Default is 100 (equals to 1° out of trim command)
		14	XPDR squawk code
73CD	**2**	**Data Pipe :** You can set data through this offset. • Make sure that you select the type of data you want to send from offset 73CC. This two offsets should be written at the same time. • Data format is the same as used in read offsets, or raw data if not explicitly written in offset 73CC list.	
73CF	**1**	**Miscellaneous controls :** Set/clear bots separately	
		0	Manual Braking (to override Auto-Brake)
		1	Reserved for future use
		2	Reserved for future use
		3	Reserved for future use
		4	Reserved for future use
		5	Reserved for future use
		6	Reserved for future use
		7	Reserved for future use
78E8	**1**	**STBY instruments controls. Set value**	
		1	Start/Stop the Chronometer
		2	Stops the E.T timer
		3	Starts the E.T timer
		4	Reset and stops the E.T timer
		5	Reset Chronometer
		6	Date/UTC time switch
		7	ILS scale switch

R
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R

OFFSET	LENGTH (bytes)	FUNCTION	
		8	Bugs menu switch
		9	ISIS "-" key
		10	ISIS "+" key
		11	ISIS rotary press button
		12	decrease baro or bugs value(if in bugs page in ISIS)
		13	increase baro or bugs value(if in bugs page in ISIS)
		14	Receiver 1 set to VOR1
		15	Receiver 1 set to ADF1
		16	Receiver 2 set to VOR2
		17	Receiver 2 set to ADF2
78E9	**2**	Trim Wheel input in degrees *100 (so varying between -400 and +1350). This value should be set very regularly, otherwise the software may think there is an user override of the wheel (if there is a big difference between command in offset 73A5 and actual position in 78E9, more than set in data pipe trim threshold).	
78EB	**1**	**FCU / EFIS controls. Set value**	
		1	SPD Pull
		2	SPD Push
		3	HDG Pull
		4	HDG Push
		5	ALT Pull
		6	ALT Push
		7	V/S Pull
		8	V/S Push
		9	AP1
		10	AP2
		11	A/THR
		12	APPR
		13	LOC
		14	EXPED
		15	HDG-VS / TRK-FPA
		16	SPD / MACH

OFFSET	LENGTH (bytes)	FUNCTION	
		17	METRIC ALT
		18	CPT FD
		19	CPT LS
		20	CPT QNH Pull
		21	CPT QNH Push
		22	CPT inHg
		23	CPT mb
		24	CPT QNH increase
		25	CPT QNH decrease
		26	CPT ND mode ILS
		27	CPT ND mode VOR
		28	CPT ND mode NAV
		29	CPT ND mode ARC
		30	CPT ND mode PLAN
		31	CPT ND range 10
		32	CPT ND range 20
		33	CPT ND range 40
		34	CPT ND range 80
		35	CPT ND range 160
		36	CPT ND range 320
		37	CPT NAV1 VOR
		38	CPT NAV1 ADF
		39	CPT NAV1 OFF
		40	CPT NAV2 VOR
		41	CPT NAV2 ADF
		42	CPT NAV2 OFF
		43	FO FD
		44	FO LS
		45	FO QNH Pull
		46	FO QNH Push

OFFSET	LENGTH (bytes)	FUNCTION	
		47	FO inHh
		48	FO mb
		49	FO QNH increase
		50	FO QNH decrease
		51	FO ND mode ILS
		52	FO ND mode VOR
		53	FO ND mode NAV
		54	FO ND mode ARC
		55	FO ND mode PLAN
		56	FO ND range 10
		57	FO ND range 20
		58	FO ND range 40
		59	FO ND range 80
		60	FO ND range 160
		61	FO ND range 320
		62	FO NAV1 VOR
		63	FO NAV1 ADF
		64	FO NAV1 OFF
		65	FO NAV2 VOR
		66	FO NAV2 ADF
		67	FO NAV2 OFF
		68	CPT CSTR
		69	CPT WPT
		70	CPT VOR DME
		71	CPT NDB
		72	CPT ARPT
		73	FO CSTR
		74	FO WPT
		75	FO VOR DME
		76	FO NDB

OFFSET	LENGTH (bytes)	FUNCTION	
		77	FO ARPT
78EC	**1**	**MCDU controls. Set value**	
		1 à 26	A to Z
		27 à 36	0 to 9
		38 à 43	LSK1 to LSK6
		44 à 49	RSK1 to RSK6
		50	CLR key pressed (see command value 75 as well)
		51	OVFY
		52	SPACE
		53	/
		54	« + » (plus operator). If you push it twice, it'll output a « - »
		55	« . » (Decimal point)
		56	DIR
		57	PROG
		58	PERF
		59	INIT
		60	DATA
		61	FPLN
		62	RAD NAV
		63	FUEL PRED
		64	SEC FPLN
		65	MCDU MENU
		66	AIRPORT
		67	Left Arrow
		68	Right Arrow
		69	Up Arrow
		70	Down Arrow
		71	BRT
		72	DIM
		73	ATC COMM, **CPT SIDE only** (provided for CPDLC Add-On by Chris Paulus)

OFFSET	LENGTH (bytes)	FUNCTION	
		74	ATC COMM, **FO SIDE only** (provided for CPDLC Add-On by Chris Paulus)
		75	CLR key released, CPT side.
		76	CLR key released, FO side.
		For FO side, simply add 183 to the value code in the table above (e.g.: 247 is FO SEC FPLN key). Does not apply to ATC COMM and CLR RELEASE key.	
78ED	**1**	**Miscellaneous controls. Set value**	
		1	Arm GND SPLRS
		2	Disarm GND SPLRS
		3	ECP TO CONF key DOWN (see value 47 for UP event) (ECP = ECAM Control Panel)
		4	ECP DOOR key DOWN (see value 62 for UP event)
		5	ECP ENG key DOWN (see value 63 for UP event)
		6	ECP BLEED key DOWN (see value 64 for UP event)
		7	ECP CAB PRESS key DOWN (see value 65 for UP event)
		8	ECP ELEC key DOWN (see value 66 for UP event)
		9	ECP HYD key DOWN (see value 67 for UP event)
		10	ECP FUEL key DOWN (see value 68 for UP event)
		11	ECP APU key DOWN (see value 69 for UP event)
		12	ECP COND key DOWN (see value 70 for UP event)
		13	ECP WHEEL key DOWN (see value 71 for UP event)
		14	ECP F/CTL key DOWN (see value 72 for UP event)
		15	ECP CLR key DOWN (see value 73 for UP event)
		16	ECP RCL key DOWN (see value 48 for UP event)
		17	ECP STS key DOWN(see value 74 for UP event)
		18	ECP EMER CANC key DOWN (see value 49 for UP event)
		19	Chrono CPT
		20	Chrono FO
		21	ATHR Take Over
		22	MASTER WARNING
		23	MASTER CAUTION
		24	CPT AP Take Over pressed

OFFSET	LENGTH (bytes)	FUNCTION	
		25	CPT AP Take Over released
		26	FO AP Take Over pressed
		27	FO AP Take Over released
		28	AUTO BRAKE LO
		29	AUTO BRAKE MED
		30	AUTO BRAKE MAX
		31	Anti Skid & NWS ON
		32	Anti Skid & NWS OFF
		33	Connect / Disconnect EXT PWR
		34	Connect / Disconnect GND HP
		35	Stow RAT (even in-flight)
		36	TCAS ALL
		37	TCAS THRT
		38	TCAS BLW
		39	TCAS ABV
		40	TCAS STBY
		41	TCAS TA/RA
		42	TCAS TA Only
		43	CPT TERR ON ND
		44	FO TERR ON ND
		45	Connect FBW module
		46	Disconnect FBW module
		47	ECP TO CONF key UP (see value 3 for DOWN event)
		48	ECP RCL key UP (see value 16 for DOWN event)
		49	ECP EMER CANC key UP (see value 18 for DOWN event)
		50	AUTOLAND key DOWN
		51	AUTOLAND key UP
		52	GPWS / GS key DOWN
		53	GPWS / GS key UP
		54	FLAPS Increment

OFFSET	LENGTH (bytes)	FUNCTION	
		55	FLAPS Decrement
		56	FLAPS 0
		57	FLAPS 1
		58	FLAPS 2
		59	FLAPS 3
		60	FLAPS FULL
		61	BRK FAN toggle
		62	ECP DOOR key UP (see value 4 for DOWN event)
		63	ECP ENG key UP (see value 5 for DOWN event)
		64	ECP BLEED key UP (see value 6 for DOWN event)
		65	ECP CAB PRESS key UP (see value 7 for DOWN event)
		66	ECP ELEC key UP (see value 8 for DOWN event)
		67	ECP HYD key UP (see value 9 for DOWN event)
		68	ECP FUEL key UP (see value 10 for DOWN event)
		69	ECP APU key UP (see value 11 for DOWN event)
		70	ECP COND key UP (see value 12 for DOWN event)
		71	ECP WHEEL key UP (see value 13 for DOWN event)
		72	ECP F/CTL key UP (see value 14 for DOWN event)
		73	ECP CLR key UP (see value 15 for DOWN event)
		74	ECP STS key UP (see value 17 for DOWN event)
		75	ECP ALL key DOWN
		76	ECP ALL key UP
		77	Rudder Trim selector to the left
		78	Rudder Trim selector to the right
		79	Rudder Trim selector neutral
		80	Rudder Trim reset
		81	LDG Gear LVR UP
		82	LDG Gear LVR DN
		83	XPDR 0
		84	XPDR 1

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OFFSET	LENGTH (bytes)	FUNCTION	
		85	XPDR 2
		86	XPDR 3
		87	XPDR 4
		88	XPDR 5
		89	XPDR 6
		90	XPDR 7
		91	XPDR IDENT
		92	XPDR CLR
		93	XPDR STBY
		94	XPDR AUTO
		95	XPDR ON
		96	XPDR ALT RPTG ON
		97	XPDR ALT RPTG OFF
		98	GRAVITY LDG GEAR OFF (normal position)
		99	GRAVITY LDG GEAR ON (extended position)
78EE	**1**	**Overhead controls. Set value**	
		1	WING AI
		2	ENG1 AI
		3	ENG2 AI
		4	Strobes ON
		5	Strobes OFF
		6	Strobes AUTO
		7	Beacon ON
		8	Beacon OFF
		9	Wing light ON
		10	Wing Light OFF
		11	NAV&Logo ON
		12	NAV&Logo OFF
		13	RWY turnoff ON
		14	RWY turnoff OFF

OFFSET	LENGTH (bytes)	FUNCTION	
		15	Left LDG light ON
		16	Left LDG light OFF
		17	Left LDG light Retract
		18	Right LDG light ON
		19	Right LDG light OFF
		20	Right LDG light Retract
		21	Nose light TO
		22	Nose light Taxi
		23	Nose light OFF
		24	APU MASTER
		25	APU START
		26	CAB PRESS MAN V/S UP (see note at the end of table).
		27	CAB PRESS MAN V/S DOWN (see note at the end of table)
		28	CAB PRESS MODE SEL DOWN (see note at the end of table)
		29	LDG elevation AUTO
		30	LDG elevation Increase
		31	LDG elevation Decrease
		32	DITCHING
		33	Seat Belts Sign ON
		34	Seat Belts Sign OFF
		35	Seat Belts Sign AUTO
		36	No Smoking Sign ON
		37	No Smoking Sign OFF
		38	No Smoking Sign AUTO
		39	RAT
		40	GPWS SYS
		41	GPWS G/S
		42	GPWS FLAP MODE
		43	GPWS LDG FLAP 3
		44	PACK Flow LO

OFFSET	LENGTH (bytes)	FUNCTION	
		45	PACK Flow NORM
		46	PACK Flow HI
		47	PACK1
		48	PACK2
		49	ENG1 BLEED
		50	ENG2 BLEED
		51	APU BLEED
		52	RAM AIR
		53	HOT AIR
		54	CKPT Temperature decrease
		55	CKPT Temperature increase
		56	CKPT Température 24°C
		57	FWD Temperature decrease
		58	FWD Temperature increase
		59	FWD Temperature 24°C
		60	AFT Temperature decrease
		61	AFT Temperature increase
		62	AFT Température 24°C
		63	X-BLEED SHUT
		64	X-BLEED AUTO
		65	X-BLEED OPEN
		66	FWD cargo ISOL. Valve
		67	AFT cargo ISOL. Valve
		68	CARGO HOT AIR
		69	CARGO FWD Temperature decrease
		70	CARGO FWD Temperature increase
		71	CARGO AFT Temperature decrease
		72	CARGO AFT Temperature increase
		73	ENG1 MAN START
		74	ENG2 MAN START

OFFSET	LENGTH (bytes)	FUNCTION	
		75	GALLEY SHED
		76	GEN1
		77	GEN2
		78	APU GEN
		79	EXT PWR
		80	BUS TIE
		81	AC ESS FEED
		82	BAT1
		83	BAT2
		84	ENG1 HYD PUMP
		85	ENG2 HYD PUMP
		86	BLUE HYD PUMP
		87	YELLOW ELEC PUMP
		88	PTU
		89	FUEL X-FEED
		90	LTK1
		91	LTK2
		92	CTK1
		93	CTK2
		94	FUEL MODE SEL
		95	RTK1
		96	RTK2
		97	ENG1 MASTER SW ON
		98	ENG1 MASTER SW OFF
		99	ENG2 MASTER SW ON
		100	ENG2 MASTER SW OFF
		101	ENG start CRANK
		102	ENG start NORM
		103	ENG start IGN/START
		104	CAB PRESS MAN V/S release (see note at the end of table)

OFFSET	LENGTH (bytes)	FUNCTION	
		105	CAB PRESS MODE SEL released (see note at the end of table)
		106	WINDOWS/PROBE HEAT
		107	ADR1
		108	ADR2
		109	ADR3
		110	IR1 OFF
		111	IR1 NAV
		112	IR1 ATT
		113	IR2 OFF
		114	IR2 NAV
		115	IR2 ATT
		116	IR3 OFF
		117	IR3 NAV
		118	IR3 ATT
		119	ADIRS display TEST
		120	ADIRS display TK/GS
		121	ADIRS display PPOS
		122	ADIRS display WIND
		123	ADIRS display HDG
		124	ADIRS display STS
		125	ADIRS display SYS OFF
		126	ADIRS display SYS1
		127	ADIRS display SYS3
		128	ADIRS display SYS2
		129	ELAC1
		130	ELAC2
		131	SEC1
		132	SEC2
		133	SEC3
		134	FAC1

OFFSET	LENGTH (bytes)	FUNCTION	
		135	FAC2
		136	ANN LT TEST
		137	ANN LT DIM
		138	ENG1 FIRE HANDLE
		139	ENG2 FIRE HANDLE
		140	APU FIRE HANDLE
		141	ENG1 AGENT1
		142	ENG1 AGENT2
		143	ENG2 AGENT1
		144	ENG2 AGENT2
		145	APU AGENT
		146	ENG1 FIRE TEST key DOWN
		147	ENG1 FIRE TEST key UP
		148	ENG2 FIRE TEST key DOWN
		149	ENG2 FIRE TEST key UP
		150	APU FIRE TEST key DOWN
		151	APU FIRE TEST key UP
		152	EGPWS TERR
		153	IDG 1
		154	IDG 2
		Note for cabin pressure MAN V/S UP/DN and MODE SEL switches : Those switches must/can be held down in order to achieve their primary or a secondary function. They need to know when they are pushed down and when they are released. The “pushing down” actions are the offset values 26, 27 & 28. The “release" actions are the offset values 104 & 105.	

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6. OPENCOCKPITS and SIOC

Writing a SIOC code is not an easy task for many people. Also, the FSUIPC offsets of my software are not so easy to use, but their limited number means it is difficult to make it otherwise. SIOC can quickly become a nightmare when you need to make complex interactions between hardware and software.

I made it so all the complex computations and programming are part of the software:

- Both MCDU (CPT & F/O),
- FCU,
- Both EFIS (CPT & F/O),
- Overhead (Lower & Upper),
- Radio Management Panels (Pedestal),
- Transponder « XPDR » (Pedestal).
- Almost all other panels

SIOC use is now limited to telling the « FMGS Server » inputs/outputs numbers, i.e. the wiring.

You just need to use « SIOC_Creator », an application shipped with FMGS suite. This chapter details the use of this applications.

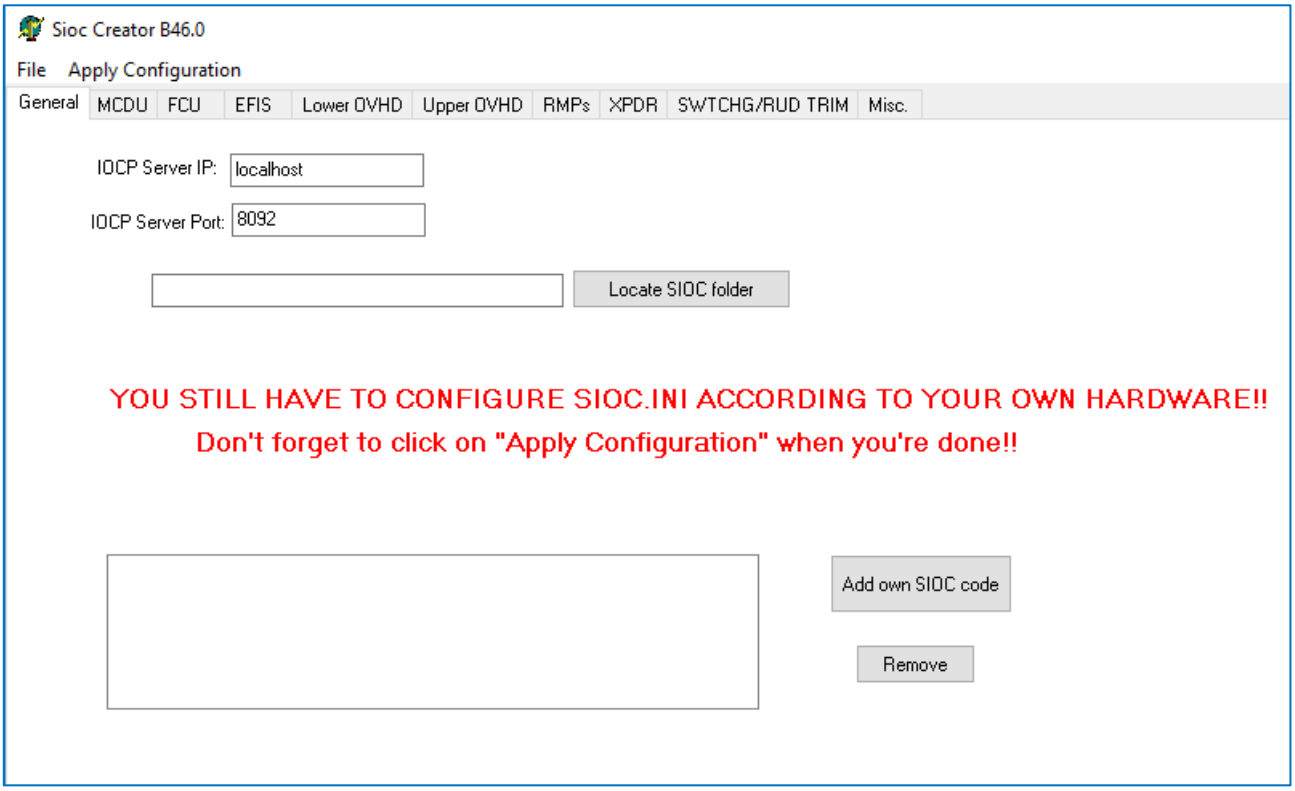
« SIOC_Creator » is in « Hardware Modules » folder. There are other files related to SIOC in that folder, if you lose one, it might be in here. Of course, you need to have installed “SIOC Support” module during installation.

BACKUP all your SIOC files, particularly SIOC.ini and the « .ssi » files you were using before using SIOC Creator!

If you installed SIOC in its default folder (“Program Files”) SIOC Creator will need administrator rights to copy « .ssi » files in that folder. If you do not know how to use admin rights, easiest is to reinstall SIOC in another folder (C:\games\SIOC, or C:\SIOC, …).

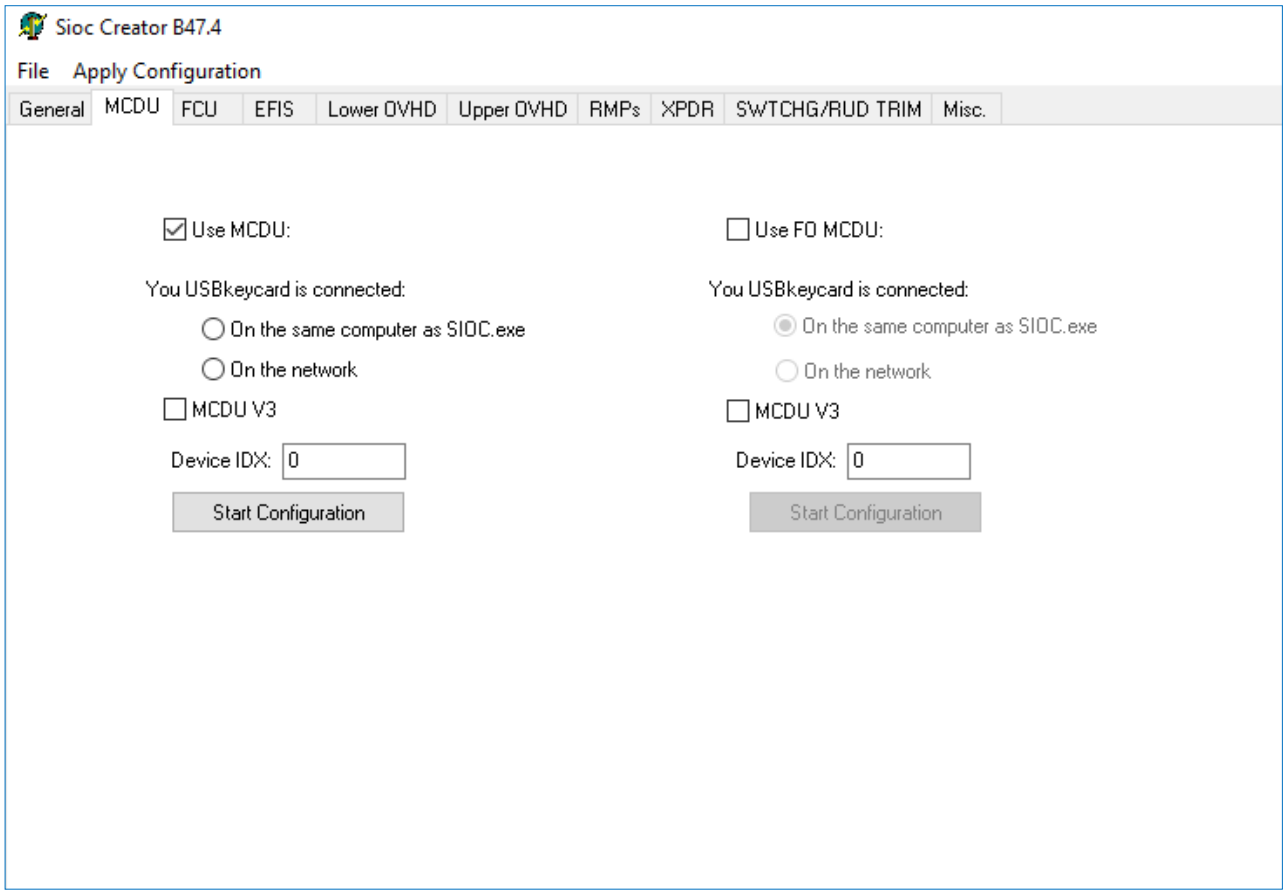
6.1 - General tab

When you launch SIOC_Creator, the “General” tab is displayed :



- **IOCP Server IP / IOCP Server Port:** enter the IP address and port of the SIOC server, which you can find in your SIOC.ini file.
- Please note the SIOC.ini still needs to be configured by the user!
- **Locate SIOC folder:** Click on that button to locate SIOC folder, by browsing until you find and select SIOC.exe.
- **« File » menu:** lets you create a new configuration from scratch, save current work, or open an existing configuration.
- **« Apply configuration » menu: You MUST click on this button once you have finished working on your configuration,** otherwise the configuration you made will not be taken into account …
- **Add own SIOC code:** lets you merge your own SIOC source code, in « .txt » format, to the code created by SIOC_Creator. It helps you add functions not covered by SIOC Creator.
  - To add your own code, click on « Add own SIOC code » then select your .txt file. You can add several files this way.
  - The only limitation is the numbering of the variables, as SIOC_Creator **will not check** if several variables have the same number as already assigned by SIOC Creator ; It is thus recommended to start numbering you own variables starting from at least 500 (variable 0 can however be used, it is an initialization variable not used by SIOC Creator).

6.2 - MCDU tab



This tab is used to configure MCDUs. The MCDUs muust be associated to USB keys cards from Openccockpits. All MCDU versions *including current « V3 »* should be easily recognized if you correctly installed all Opecockpits drivers/software :

(☞ **www.opencockpits.com**).

- First check the “Use MCDU” box. Then, if you MCDU is plugged on the same PC running SIOC Creator, select the first option, otherwise select the second option.
- If you use an Opencockpits MCDU V3, check the V3 box…
- A caution message appears, make sure you comply with its requirements...
- After clicking OK, SIOC will be configured for the MCDU setup.
- Another caution message appears asking you to run SIOC.
- At this stage, if your card is on a remote computer, you will need to manually copy the IOCKeys.ini created by SIOC CREATOR and overwrite the one in your IOCKeys folder on the remote computer. Then run IOCKeys.exe, click OK and continue.
- A new window appears, asking you to push buttons on your MCDU :

- Comply by pushing the correct key on your MCDU, until the window disappears.
- You can now save your configuration (and apply it).

Same logic goes for the FO MCDU.

6.3 - FCU, EFIS, OVHD, RMP, XPDR, RUD TRIM & Misc tabs

All these tabs work the same way. They show a graphical representation of the panels, that will allow you to “describe” your wiring.

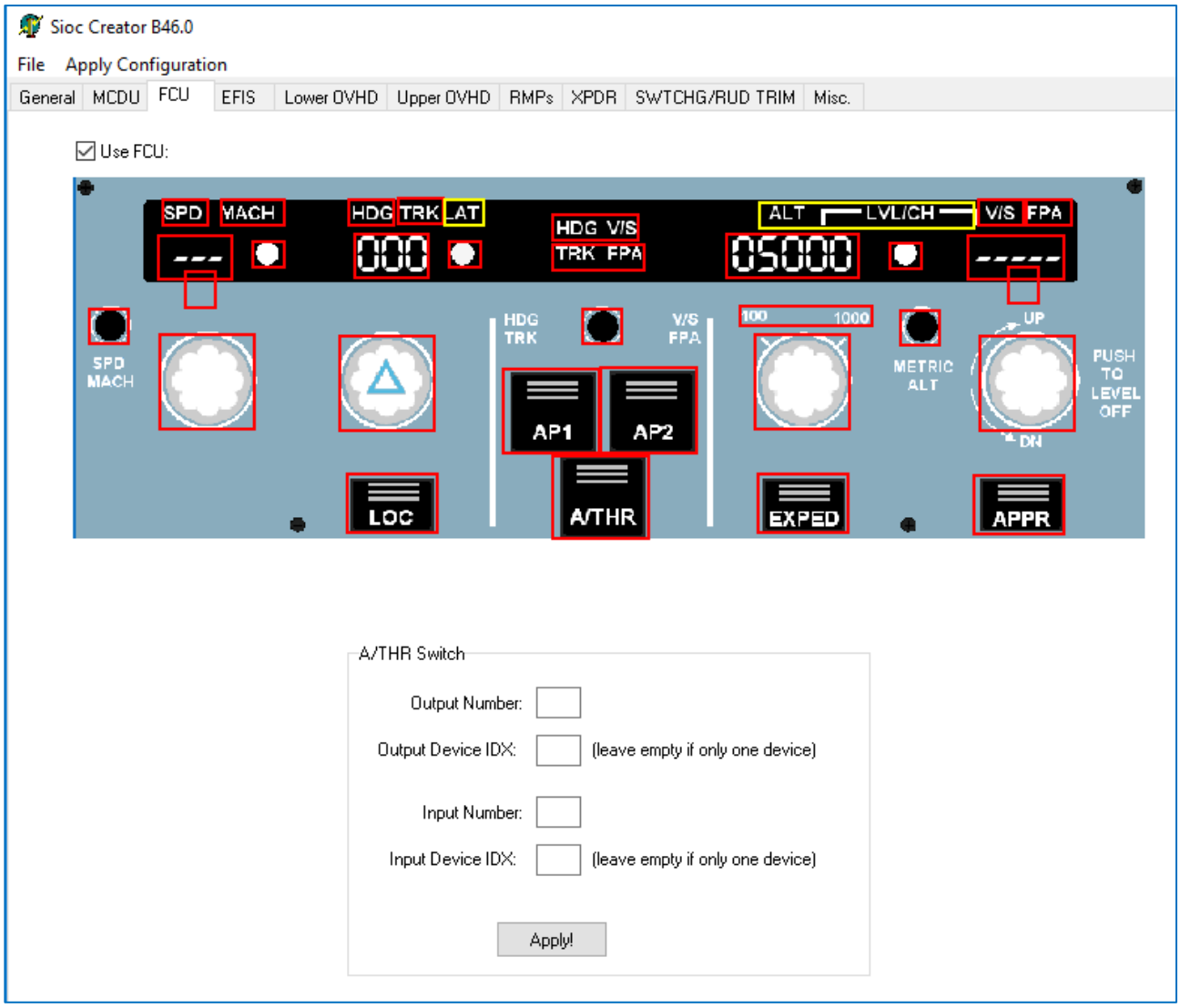
After checking the « Use FCU » (or « Use EFIS », etc…) box, the picture of the panel will show up with red rectangles around the switches, LEDs, etc…

To configure a control, first click in the red rectangle you want to configure. A configuration panel will appear below.

You then only need to declare which inputs or outputs numbers you want to use, based on your own wiring. For more information on the IDX number of the cards, check OpenCockpits documentation regarding SIOC.ini setup.

There are several controls types you can declare :

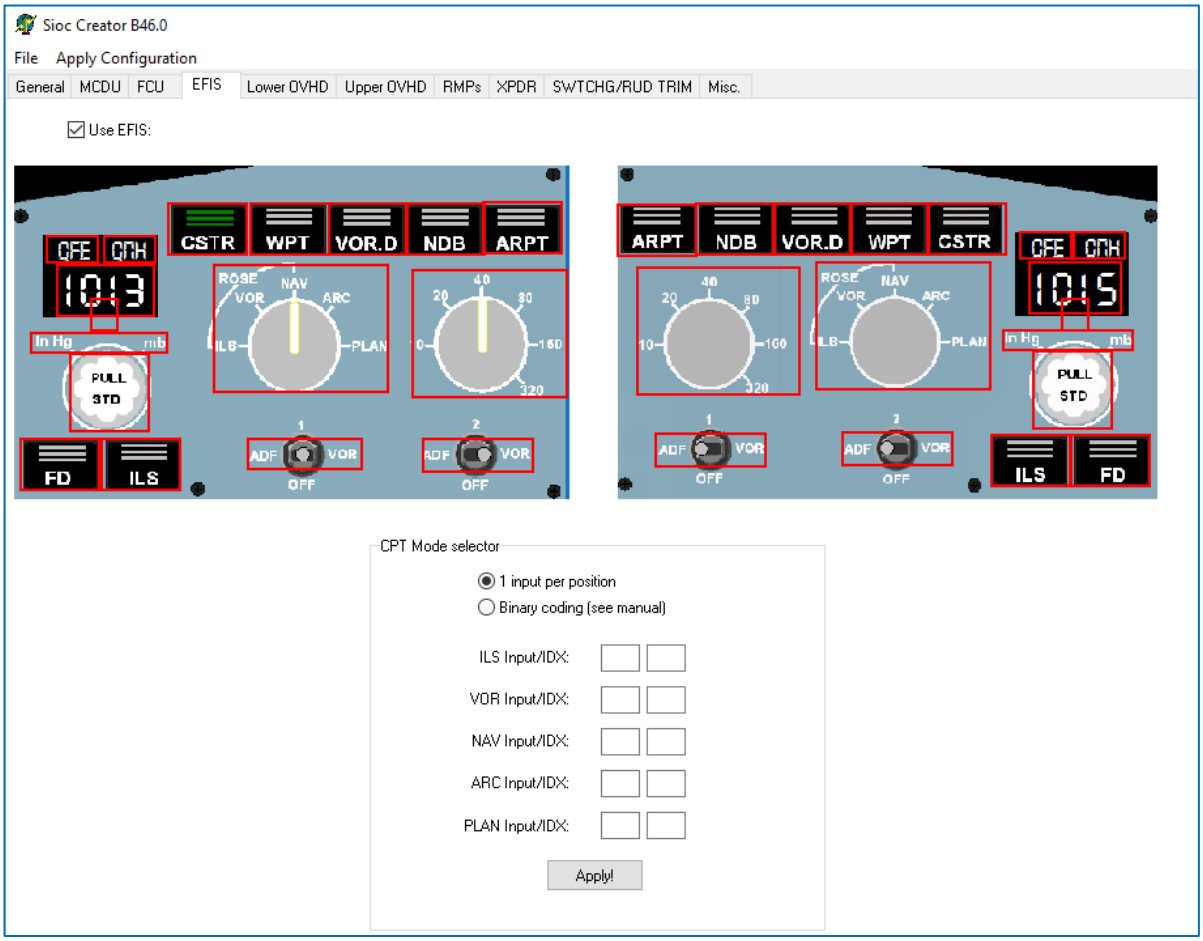
- Simple switches,
- LEDs,
- 7-segments displays,
- Switches with built-in LED(s),
- Encoders with built-in push/release switches.

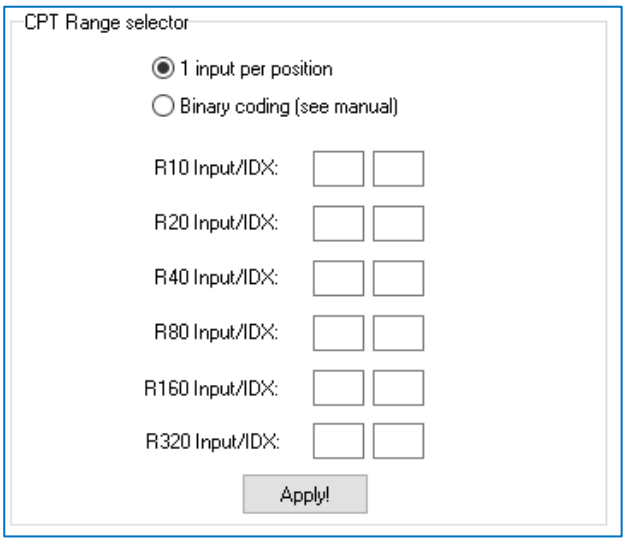


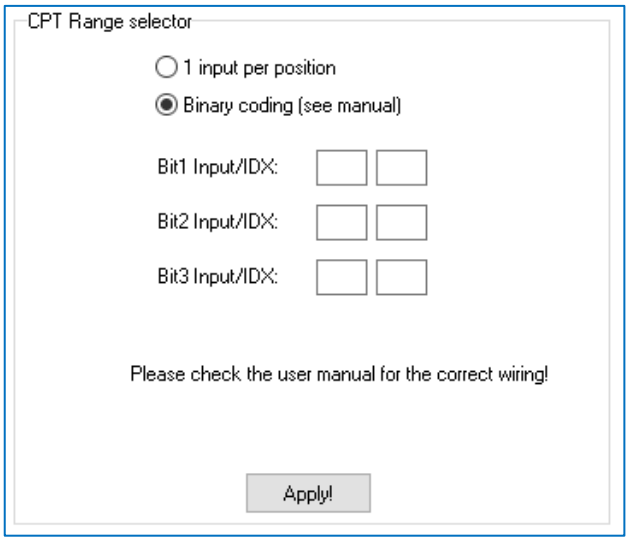
If you wish to use a “push” only encoder instead of a “push-pull” one (FCU encoders), you can use the “long push=pull” function. In that case, pushing the encoder for more than 750ms will translate in a “pull” action.

The EFIS range and mode and ADIRS selectors have two modes. The 1-input per position mode is straight forward. But if you need to save inputs on your cards, you can use the binary coding mode.

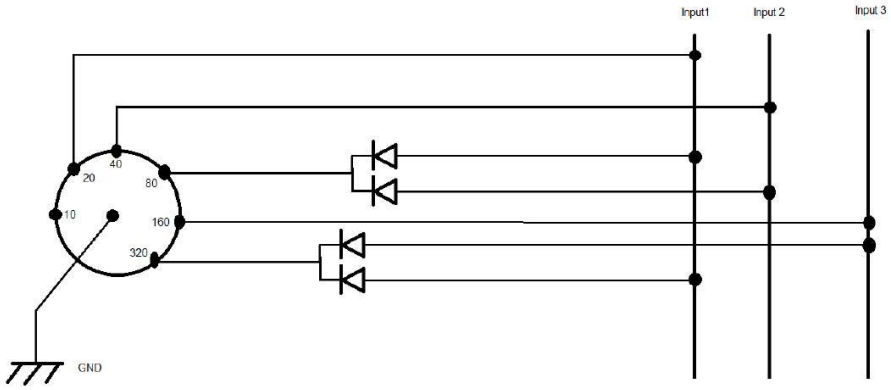
Here are the different choices :


Sioc Creator B46.0
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
XPDR
SWTCHG/RUD TRIM
Misc.
Use EFIS:
CSTR
WPT
VOR.D
NDB
ARPT
ROSE
NAV
VOR
ARC
ILS
PLAN
In Hg
mb
PULL STD
ADF
VOR
OFF
FD
ILS
CPT Mode selector
1 input per position
Binary coding (see manual)
ILS Input/IDX:
VOR Input/IDX:
NAV Input/IDX:
ARC Input/IDX:
PLAN Input/IDX:
Apply!


CPT Range selector
1 input per position
Binary coding (see manual)
R10 Input/IDX:
R20 Input/IDX:
R40 Input/IDX:
R80 Input/IDX:
R160 Input/IDX:
R320 Input/IDX:
Apply!


CPT Range selector
1 input per position
Binary coding (see manual)
Bit1 Input/IDX:
Bit2 Input/IDX:
Bit3 Input/IDX:
Please check the user manual for the correct wiring!
Apply!

Here is the schematic for the range mode selector :



The diodes are used to avoid short-circuits !!

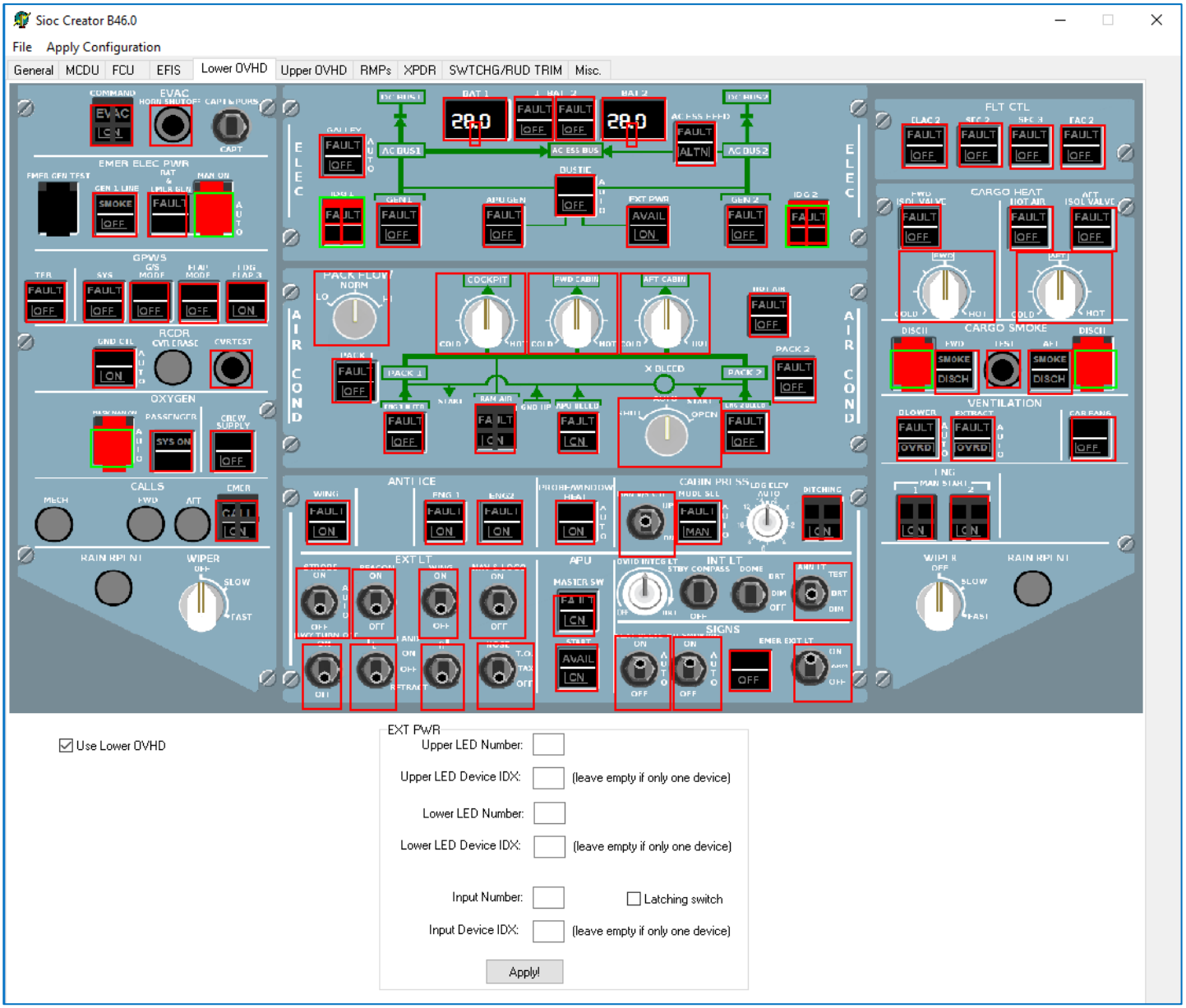
Same logic applies to the other selectors.

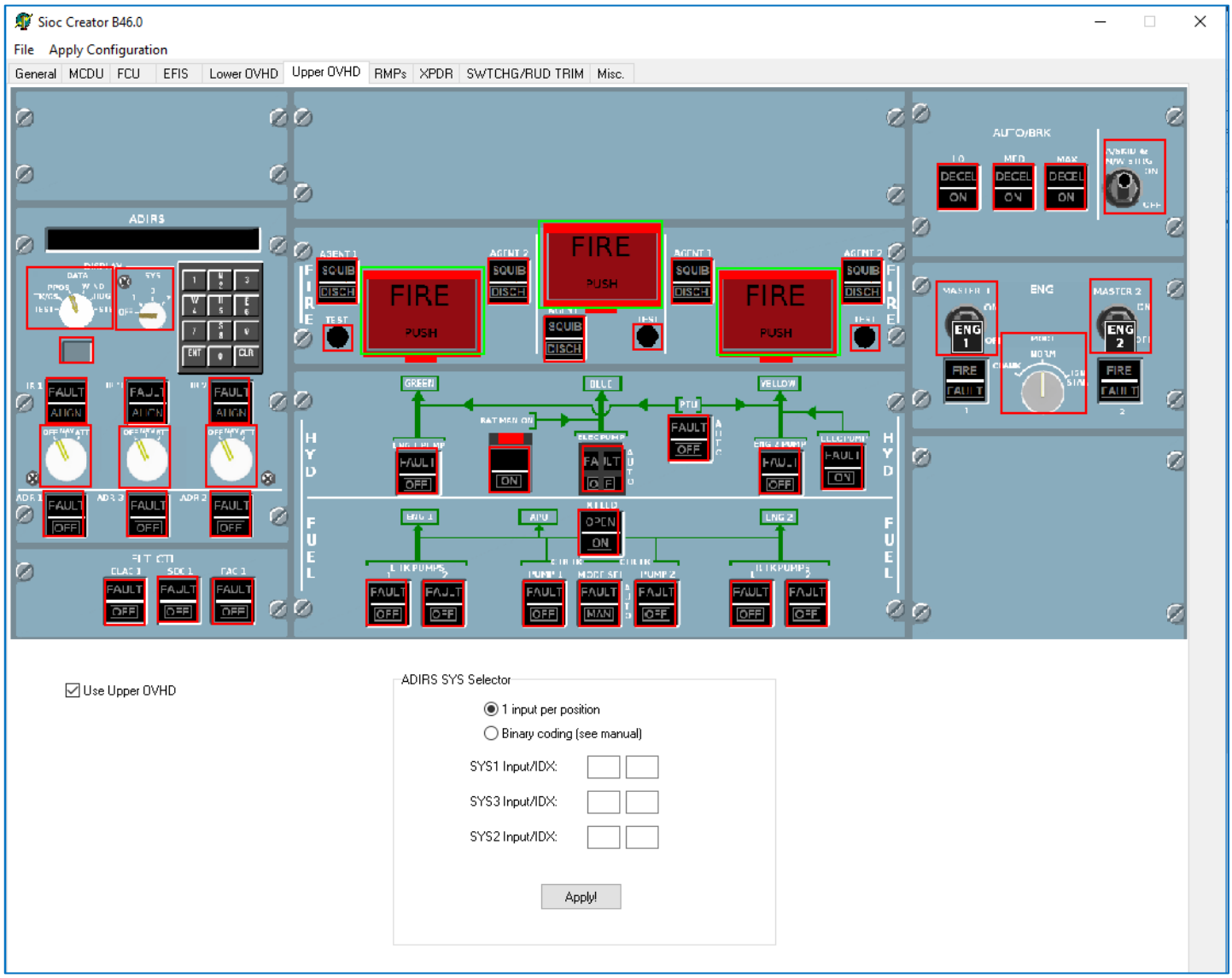
Regarding the OVHD « korries », an option called « latching » may be used. For dual stable positions switches (ON-OFF), you can check this option.

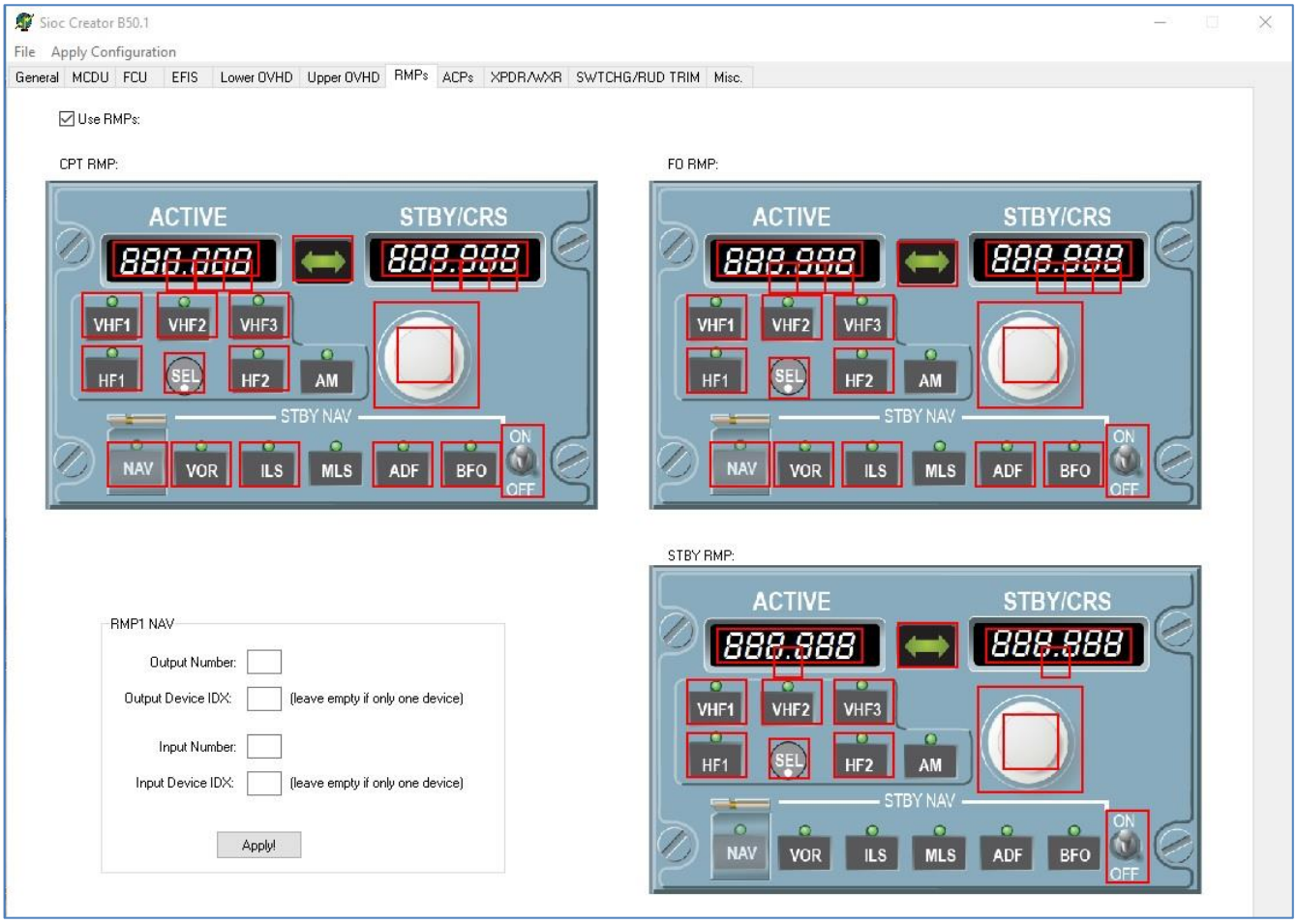
If you use single stable position switches (MON-OFF), uncheck that option, so that on each press of the switch the korry will change its state.

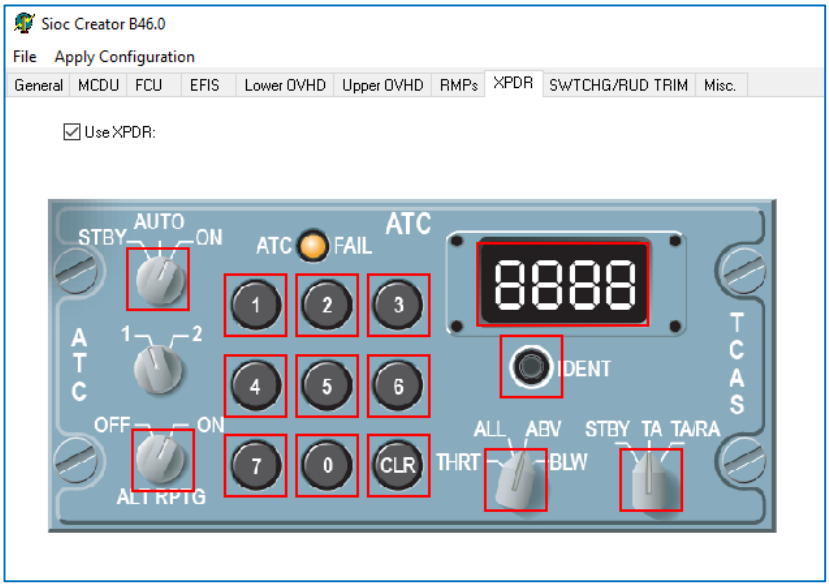
The following « Korries » are MON-OFF switches on the real aircraft , so you will need this kind of switches for them (and « latching » option will be of no use):

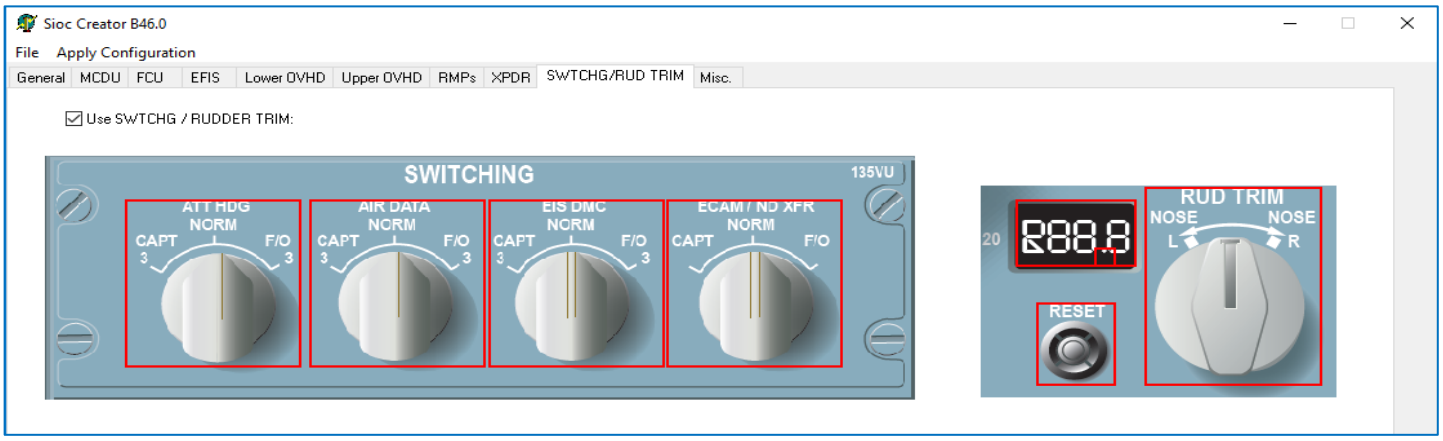
- EXT PWR,
- APU START,
- Autobrake LO, MED & MAX,
- YELLOW ELECTRIC PUMP,
- ADR 1, 2 & 3.


Sioc Creator B46.0
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
XPDR
SWTCHG/RUD TRIM
Misc.
Use Lower OVHD
EXT PWR
Upper LED Number:
Upper LED Device IDX:
(leave empty if only one device)
Lower LED Number:
Lower LED Device IDX:
(leave empty if only one device)
Input Number:
Latching switch
Input Device IDX:
(leave empty if only one device)
Apply!


Sioc Creator B46.0
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
XPDR
SWTCHG/RUD TRIM
Misc.
ADIRS
FIRE
PUSH
AUTO/BRK
ENG
Use Upper OVHD
ADIRS SYS Selector
1 input per position
Binary coding (see manual)
SYS1 Input/IDX:
SYS3 Input/IDX:
SYS2 Input/IDX:
Apply!


Sioc Creator B50.1
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
ACPs
XPDR/WXR
SWTCHG/RUD TRIM
Misc.
Use RMPs:
CPT RMP:
FO RMP:
STBY RMP:
ACTIVE
STBY/CRS
888.888
VHF1
VHF2
VHF3
HF1
SEL
HF2
AM
STBY NAV
NAV
VOR
ILS
MLS
ADF
BFO
ON
OFF
RMP1 NAV
Output Number:
Output Device IDX:
(leave empty if only one device)
Input Number:
Input Device IDX:
(leave empty if only one device)
Apply!


Sioc Creator B46.0
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
XPDR
SWTCHG/RUD TRIM
Misc.
Use XPDR:
ATC
STBY
AUTO
ON
ATC
FAIL
8888
1
2
3
4
5
6
7
0
CLR
IDENT
OFF
ON
ALT RPTG
ALL
ABV
THRT
BLW
STBY
TA
TA/RA
TCAS

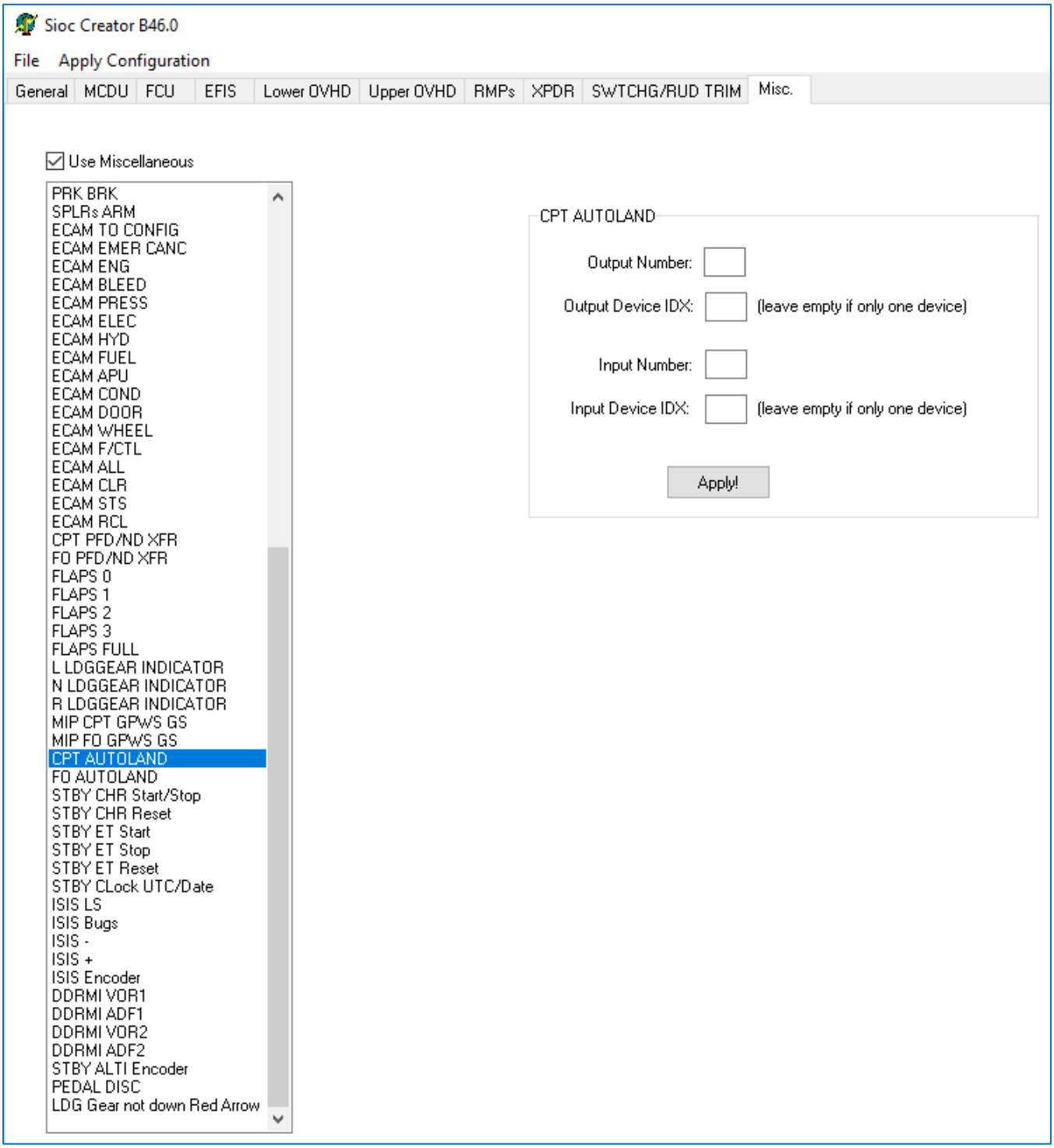


6.4 - Other controls and analog axis

The « Misc » tab lets you declare other controls which are not part or the other. The controls are listed in the left part of « Misc » tab (see next picture).

Regarding analog axis, there are two kind of them :

- First, on the OVHD, there are a few potentiometers which ask for an analog axis declaration. These need to be directly declared there.
- The other are declared in the « Misc » tab : You can declare up to 16 different analog axis, which will then be recognized in FMGS_Config application, same as normal joystick axis would be.


Sioc Creator B46.0
File
Apply Configuration
General
MCDU
FCU
EFIS
Lower OVHD
Upper OVHD
RMPs
XPDR
SWTCHG/RUD TRIM
Misc.
Use Miscellaneous
PRK BRK
SPLRs ARM
ECAM TO CONFIG
ECAM EMER CANC
ECAM ENG
ECAM BLEED
ECAM PRESS
ECAM ELEC
ECAM HYD
ECAM FUEL
ECAM APU
ECAM COND
ECAM DOOR
ECAM WHEEL
ECAM F/CTL
ECAM ALL
ECAM CLR
ECAM STS
ECAM RCL
CPT PFD/ND XFR
FO PFD/ND XFR
FLAPS 0
FLAPS 1
FLAPS 2
FLAPS 3
FLAPS FULL
L LDGGEAR INDICATOR
N LDGGEAR INDICATOR
R LDGGEAR INDICATOR
MIP CPT GPWS GS
MIP FO GPWS GS
CPT AUTOLAND
FO AUTOLAND
STBY CHR Start/Stop
STBY CHR Reset
STBY ET Start
STBY ET Stop
STBY ET Reset
STBY CLock UTC/Date
ISIS LS
ISIS Bugs
ISIS -
ISIS +
ISIS Encoder
DDRMI VOR1
DDRMI ADF1
DDRMI VOR2
DDRMI ADF2
STBY ALTI Encoder
PEDAL DISC
LDG Gear not down Red Arrow
CPT AUTOLAND
Output Number:
Output Device IDX:
(leave empty if only one device)
Input Number:
Input Device IDX:
(leave empty if only one device)
Apply!

7. Flight model

7.1 - Aircraft.ini

This file is located in the FMGS Server\PERF\CFM and FMGS Server\PERF\IAE folders.

You can use it to adapt your aircraft to the FMGS software.
Since version B48.0, the FMGS Server application also has a window to set some of these options in realtime.

It should look like:

```
[AIRCRAFT]
StatusTitle=A320-214

EPR/N1=N1
Baro=mb
VFE_1=230
VFE_1+F=215
VFE_2=200
VFE_3=185
VFE_4=177
VLE=280
flaps_position.0=0
flaps_position.1=0
flaps_position.2=10
flaps_position.3=15
flaps_position.4=20
flaps_position.5=35
slats_position.0=0
slats_position.1=18
slats_position.2=18
slats_position.3=22
slats_position.4=22
slats_position.5=27
delta_RadioAltitude=12
MaxOilPressScale=100
IncreasingHighOilPressPulse=90
DecreasingHighOilPressPulse=85
IncreasingLowOilPressPulse=20
DecreasingLowOilPressPulse=16
RedLowOilPress=13
IncreasingHighOilTempPulse=140
DecreasingHighOilTempPulse=135
HighOilTempAmber15min=140
HighOilTempAmberImm=155
```

```
QFEoption=yes
INITBaccessible=yes
AFTcargoVent=yes
AFTcargoHeat=yes
FWDcargoVent=yes
FWDcargoHeat=yes
CargoSmokeOptions=SINGLE
Spacing833=yes
EISmodel=1
GPWSannunnciatorEnhanced=no
AllowGSbeforeLOC=no
SwitchGATRKtoNAV=yes
VSmodeRemovesAPPNAV=no
LinkISISQNHtoCPT=no
MMO=0.82
VMO=350
aircraft.cfg=A320-214\aircraft.cfg
airfile=A320-214\cfm56_5B4.air
```

The **StatusTitle** is the text that will be displayed on your MCDUs status page

EPR/N1 setting indicates which type of engine (and associated EWD display) is used.

Baro is the default EFIS unit on startup, either mb or inHg.

VFE _1 à 4 are the flaps maximum speeds (VFE) for each flaps setting.

VLE is the landing gear maximum speed.

flaps_position and **slats_position** lines are the relationship between flaps/slats setting and the actual flaps/slats angle in degrees.

delta_RadioAltitude is the radio altimeter offset required so that the radio altimeter reads 0 while in ground.

Increasing/decreasingHigh/lowoilPress/tempPulse options set the values at which the oil pressure/temperature needle starts/stops pulsing.

HighOilTempAmber15min/Imm options set the values where the oil temperature needle comes on amber after 15 minutes or immediately.

RedLowOilPress option sets the value where the oil pressure needles comes on red.

QFEoption is to allow the EFIS optional QFE mode (pushing on the QNH encoder to switch between QNH and QFE)

INITBAccessible option allows the INITB page to still be accessible after engine start.

AFT/FWD cargo Vent/heat : options to set the cargo ventilation and heating system

CargoSmokeOptions is the number of squibs for the cargo compartment (either single or double).

Spacin833 is the VHF channel spacing, either 8.33 or 25 kHz

GPWSannunciatorEnhanced is an option for newer GPWS (different annunciator).

AllowGSbeforeLoc is an option for older aircraft where GS capture was allowed vefore LOC*/LOC mode engaged.

SwitchGATRKtoNAV is an option on newer FMGS standards where the aircraft automatically switches to NAV mode after go around, if NAV conditions are met.

VSmodeRemovesAPPNAV is an option on some FMGS to disengage APP NAV if VS mode is selected.

LinkISISQNHtoCPT is an option for limited hardware users, to link the baro setting of the ISIS to the setting of the CPT side.

MMO and **VMO** options set the aircraft MMO and VMO (PFD display, AP/FBW limits).

Aicfraft.cfg and **airfile** options set the relative folder for the aircraft.cfg file and airfile of your simobject. The addon folder MUST be in \A320FMGS\Aircraft folder (along A320-214 and A320-233 models).

The flight model you use must have the same values for the flaps lever number of positions, flaps/slats angles, as declared here.
These values are declared in the aircraft.cfg file of your flight model (FSX\SimObjects\Airplanes\your_plane_folder or any path you declared in your simobjects.cfg). It is required to have a copy (or the working addon) of the addon folder \A320FMGS\Aircraft folder in You may also need to change the number of fuel tank selectors, as indicated below :

```
[flaps.0]
type=1                                  // 1 - tail, 2 - lead
system_type=1
flaps-position.0=0.000                  // degrees
flaps-position.1=0.000                  // degrees
flaps-position.2=15.000                 // degrees
flaps-position.3=20.000                 // degrees
flaps-position.4=26.000                 // degrees
flaps-position.5=35.000                 // degrees

[flaps.1]                               // slats
type=2                                  // 1 - tail, 2 - lead
system_type=1
flaps-position.0=0
flaps-position.1=18.000
flaps-position.2=18.000
flaps-position.3=22.000
flaps-position.4=22.000
flaps-position.5=27.000
```

```
[fuel]
number_of_tank_selectors=2
```

7.2 - Autopilot and FBW tuning

If you use another aircraft than provided, you can create your own AP/FBW coefficients, by modifying the « APFBWcoeff.ini » file and using the editor built-in the AP/FBW interface. This is not an easy task, you must master the PID concept, and it is a long trial and error process.

As a reminder, the A321 available in FSX is NOT compatible with the default coefficients.

You can also modify the sensitivity of your joystick axis in pitch and roll.

If you want to make your own coefficients, here are the basics. The formula used is :

$$A(t) = K\,p\left[\varepsilon(t) + T\,d\,\frac{d\,\varepsilon(t)}{d\,t} + \frac{1}{T\,i}\int \varepsilon(t)\,d\,t\right]$$

Except for the OP IAS modes, where it is:

$$A(t) = K\,p\,\varepsilon(t) + T\,d\,\frac{d\,\varepsilon(t)}{d\,t} + \frac{1}{T\,i}\int \varepsilon(t)\,d\,t$$

A is the resulting command, ε the error between command and position, **Kp** is the proportional gain, **Td** is the derivative gai and **Ti** the integral gain.

- If you increase **Kp**, the error will be corrected faster, but may overshoot or become unstable.
- If you increase **Td**, the system will anticipate faster and reduce oscillations. But if **Td** is too big, the system will stabilize with a static error.
- If you decrease **Ti**, the static error will decrease, but stability will decrease at the same time.

As you can see, a good tuning is the right balance on the three **Kp, Td** and **Ti**. In the default coefficients, sometimes all three P/I/D terms are used, sometimes only P/D sometimes only P/I…

7.3 - Flight Profile Data

The FMGS computes a vertical flight profile (« VNAV ») using performance data. The performance data is calculated by a specific tool available only on “motivated” request.

The dataset published with the package is only valid for the default flight model.

The complete performance data is located in the PERF sub-folder, in « FMGS Server » root. There is a separate sub-folder for each aircraft added (by default only “CFM” ou

“IAE”). The folders must all be declared in APFBWcoeff.ini file.

Let’s have a look at the PERF folder structure:

You can find in each aircraft PERF folder three sub-folders (FLEX, Profile and PID), and several .txt and .ini files.

Do not change any files in the FLEX and Profile folders directly. The PID files should be preferably changed using the editor in the AP/FBW application.

The .txt and .ini files may be modified. They concern the N1% thrust ratings of the aircraft, reference speed definitions (minimum admissible values), green dot speed, …

N1% ratings (CFM and IAE) :

- They currently show the same values as can be found in an A320 FCOM. The tables are:
  - CLBn1.txt
  - CRZn1.txt
  - MCTn1.txt
  - TOGAn1.txt

Syntax :

XX -1000 3000 7000 11000 15000 19000 23000 27000 31000 35000 39000

-54.0 73.5 75.4 77.0 77.8 78.8 79.8 80.7 81.5 82.5 83.9 83.9

-50.0 74.2 76.1 77.6 78.4 79.5 80.5 81.4 82.2 83.3 84.6 84.6

-46.0 74.8 76.8 78.3 79.1 80.2 81.2 82.1 82.9 84.0 85.3 85.3

- 1st line : XX followed by an increasing list or pressure altitude, separated by a single space character.
- Following lines: the first figure is the OAT in °Celsius, followed by the N1% ratings, for each pressure altitude value.
- You are not limited by the number of lines or columns.

EPR ratings (IAE) :

- They currently show the same values as can be found in an A320 FCOM (for non under rated aircraft). The tables are:
  - CLBepr.txt
  - CRZepr.txt
  - MCTepr.txt
  - TOGAepr.txt
- Same philosophy as N1 ratings. Currently, the EPR model is not taken from the airfile, but still computed using the N1 ratings! So you MUST have correct N1 values corresponding to the EPR ratings.

Reference speeds :

- They are defined in different files :
  - V1MIN.txt
  - V2MINconf1.txt
  - V2MINconf2.txt
  - V2MINconf3.txt
  - VRMIN.txt
- They are the minimum V1/Vr/V2 as defined in the FCOM. They are not the V1/r/2 values that must be inserted in the MCDU!
- V1 and Vr values are in knots, and are function of pressure altitude and flaps setting.
- V2 values are in knots, and are function of pressure altitude and gross weight. They are entered for three flaps settings (1+F, 2, 3).

Cost index :

- The file CostIndex.txt contains data for the managed target IAS/mach.
- Each line starts with a CI value (0 is the maximum range, 999 the fastest travel), followed by three IAS/mach couple, for CLB, CRZ and DES (in that order). Machs are multiplied by 1000 (so M0.72 is represented 720).

A/BRK:

- You can modify the A/BRK deceleration values in the file ABRK.ini.
- The fixed rate section defines a single rate for LO and MED setting as they are supposed to be possible in almost all runway conditions.
- The MAX rates vary a lot depending on the weight of the aircraft. You can define as many rates as you wish (weight.x where x starts from 0, and weights should also be in increasing values), weights are in tons and rates in ft/s².

8. Company Routes and Pilots Routes

8.1 - General

Version B49.0 has brought back the long awaited CO-RTE feature.

It has totally been rewritten from scratch, and will allow integration from third party software if someone wants to produce the right flight plan import tools.

There are 2 different “saved” flight plan types: company routes (CO-RTE) and Pilots routes (PIL-RTE). The difference is the CORTEs are normally stored in the navigation database (from Jeppesen, LIDO, etc..) and tailored to the needs of the airline operating the aircraft. PIL-RTE are entered by the pilots and saved in the FMGS for future use, usually a foreseen diversion or the return flight plan.

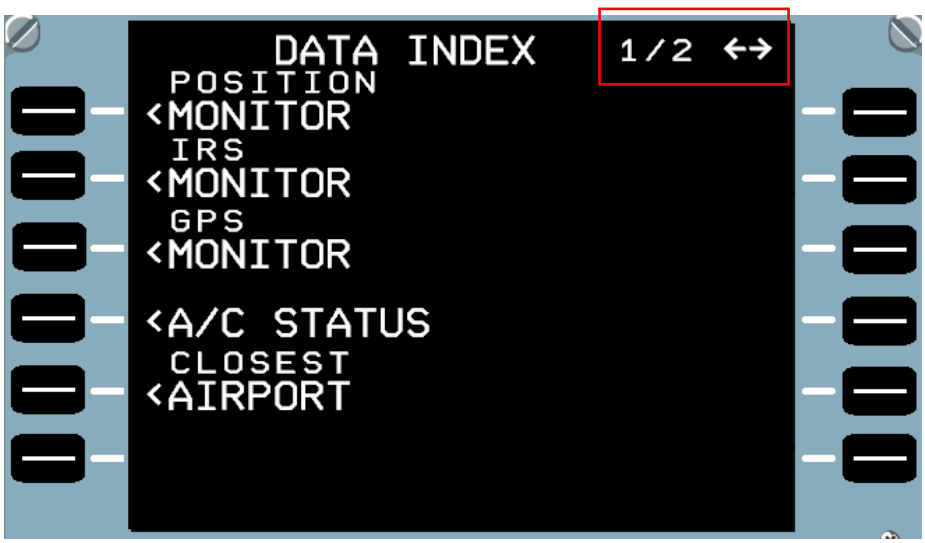
Since Flight Simulator navigation data providers do not publish any CO-RTE, they will also require user input to store them, this will be described here.

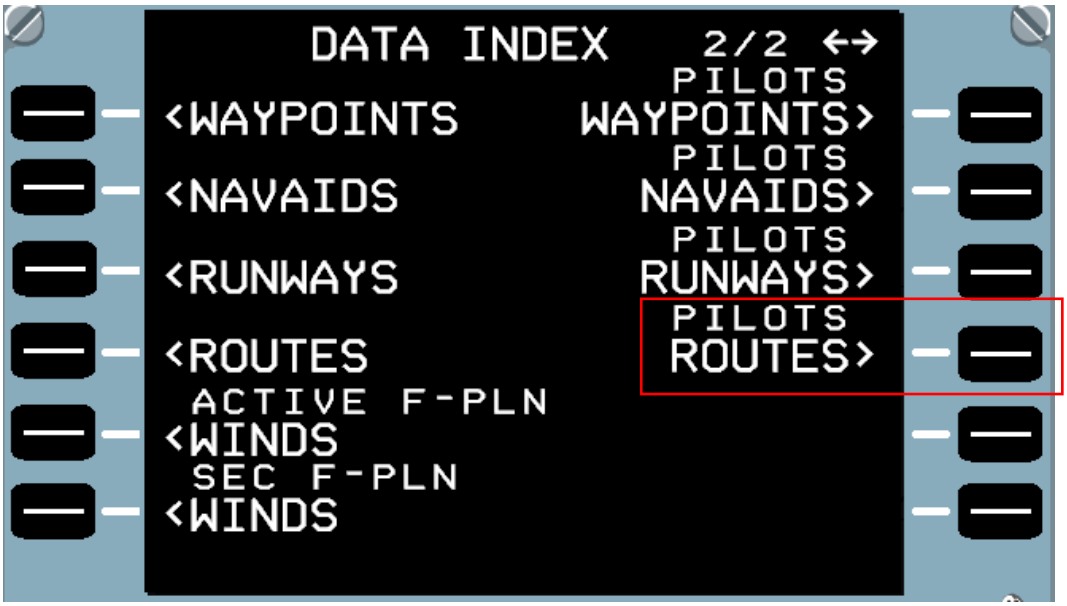
8.2 - Saving a PIL-RTE

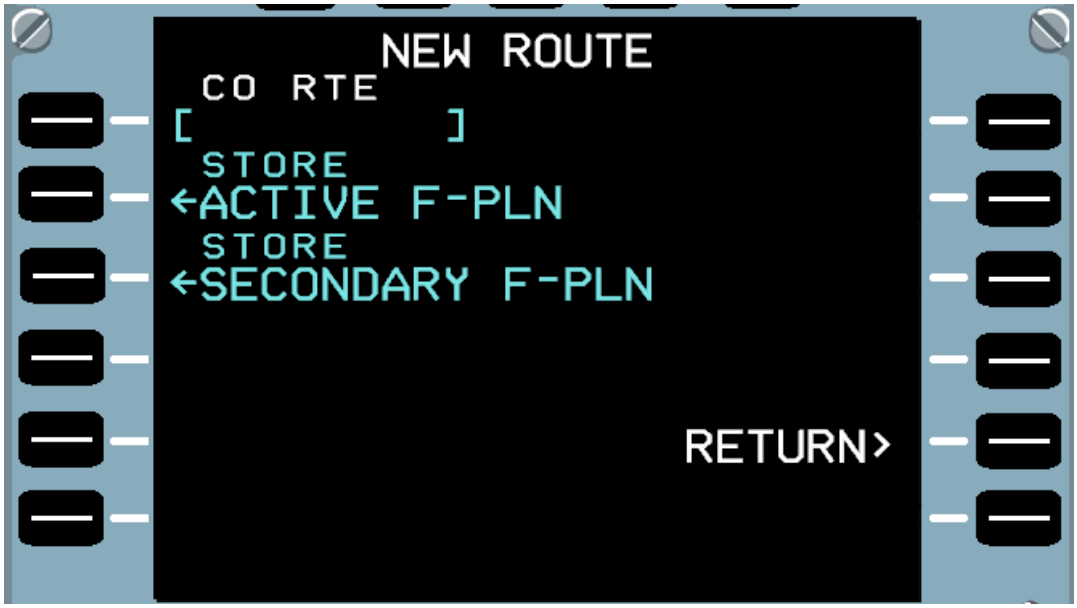
To save a PIL-RTE, you must have a route entered in your FMGS, either in the main FPLN or in the SEC FPLN. This means at the very least a TO/FROM airport couple.

Then, in the MCDU DATA Page N°2 (accessed using the DATA page key, then lateral arrows), go to the PILOTS ROUTES prompt (RSK 4).

This will bring up the NEW ROUTE page (unless you already have a PIL RTE stored, in which case you will need to push the NEW ROUTE prompt in RSK6). See the following pictures.







This page will display the ACTIVE and/or SECONDARY FPLN prompts only if they are respectively filled in (at least TO/FROM airports).

To store the route, you will need to enter a name for it. You cannot enter an already used route name. Once you click STORE prompt, with a valid name, the MCDU will store the PIL-RTE and you will be able to use it on your following flights.

It is stored in a file, described later, so it will be available even after a restart of the software, as long as you do not delete.

8.3 - CORTE.xml

All routes (PIL-RTE and CO-RTE) are stored in xml files.

There actually are two files, one for each navigation cycle (AIRAC) installed, so you can find them on your FMGS Server PC under:

C:\A320FMGS\Navdata\Navdat1\CORTE.xml

C:\A320FMGS\Navdata\Navdat2\CORTE.xml

Though the name of the files is CORTE.xml, the PIL-RTE are also stored in the same files.

PLEASE NOTE that however, only the PIL-RTE stored in the *Navdata1\CORTE.xml* file will be displayed!! So if you update your navigation data, you will need to keep that in mind and edit the CORTE.XML files accordingly.

Here is an example of CORTE.xml syntax (next page) :

```
<CORTEs>
  <CORTE   ID="NCECDG01"   TYPE="CORTE"   FROM="LFMN"   TO="LFPG"
FLTNBR="AF711BR" CI="NONE" CRZFL="NONE">
  <!--  CORTE types: CORTE or PILRTE -->
    <DEPARTURE RWY="04R" SID="OKTE6A" TRANS="NONE"/>
    <LEG SEQ="0" TYPE="AWY" ID="UM733" WPT="BULOL"/>
    <LEG SEQ="1" TYPE="AWY" ID="UZ12"  WPT="PIBAT"/>
    <!-- LEG SEQ (sequence) starts at 0 -->
    <!-- LEG types: AWY or DIR -->
    <ARRIVAL TRANS="NONE" STAR="PIBA8W" VIA="OKI4W" APPR="ILS27L"
/>
    <ALTN ICAO="LFPO" ID="CDGORY01" />
  </CORTE>
  <CORTE   ID="CDGORY01"   TYPE="CORTE"   FROM="LFPG"   TO="LFPO"
FLTNBR="AF711BR" CI="NONE" CRZFL="NONE">
     <!--  CORTE types: CORTE or PILRTE -->
     <DEPARTURE RWY="27L" SID="NONE" TRANS="NONE"/>
     <LEG SEQ="0" TYPE="DIR" WPT="RBT"/>
     <ARRIVAL TRANS="NONE" STAR="NONE" VIA="NONE" APPR="NONE"/>
     <ALTN ICAO="NONE" ID="NONE"/>
  </CORTE>
  <CORTE   ID="NCERW22"   TYPE="PILRTE"   FROM="LFMN"   TO="LFPG"
FLTNBR="NONE" CI="NONE" CRZFL="NONE">
  <!--  CORTE types: CORTE or PILRTE -->
    <DEPARTURE RWY="22L" SID="OKTE6X" TRANS="NONE"/>
    <LEG SEQ="0" TYPE="AWY" ID="UM733" WPT="BULOL"/>
    <LEG SEQ="1" TYPE="AWY" ID="UZ12"  WPT="PIBAT"/>
    <!-- LEG SEQ (sequence) starts at 0 -->
    <!-- LEG types: AWY or DIR -->
    <ARRIVAL      TRANS="NONE"      STAR="PIBA8W"      VIA="OKI4W"
APPR="ILS27L"/>
    <ALTN ICAO="NONE" ID="NONE"/>
  </CORTE>
</CORTEs>
```

- As you can see in the example, there are 3 routes defined, 2 CO-RTE and one PIL-RTE. The same syntax is used on both. SO if you want to finally use a PI-RTE as a CO-RTE, it is a matter of changing the “TYPE” field from “PILRTE” to “CORTE”.
- The route named “*CDGORY01*” is used as an ALTN CO-RTE in the “*NCECDG01*” CO-RTE. This means this route will be entered as an ALTN route when you load the “*NCECDG01*” route as a normal route, but you could also use “*CDGORY01”* as a “normal” CO-RTE (without any associated ALTN).
- PIL-RTE, though they have the same fields, do not store Cost Index, CRZ FL or FLT NBR. They can store ALTN and ALTN CO-RTE.

This document can not cover all possible settings/configurations.

Also, all configurations suggested here may not have been fully tested, and are not forming hardware/configuration specifications.

This document will evolve, as users share their experiences.