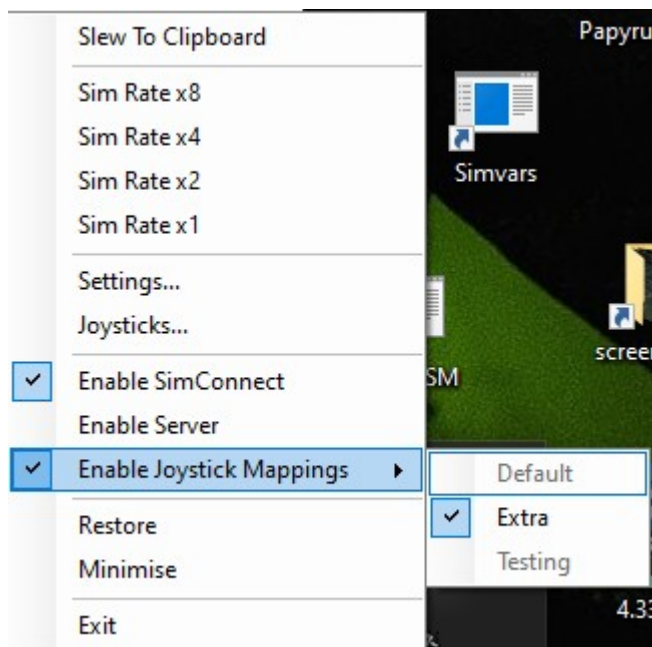# FS_Tool v0.6.1

This is the bare essentials doco for the joystick mapping functionality built into this version of FS_Tool, with specific reference to the Honeycomb Bravo throttle configuration included with the release.
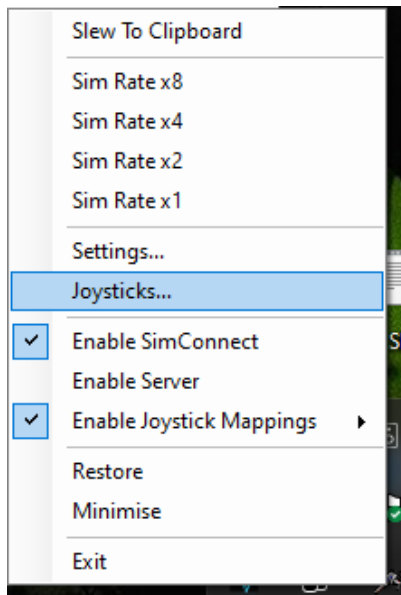
The app has a Windows task bar tray icon and is controlled by a right-click context menu from this icon.

Note that joystick mapping can only occur when the app is running and the "Enable SimConnect" and "Enable Joystick Mappings" menu options are ticked.
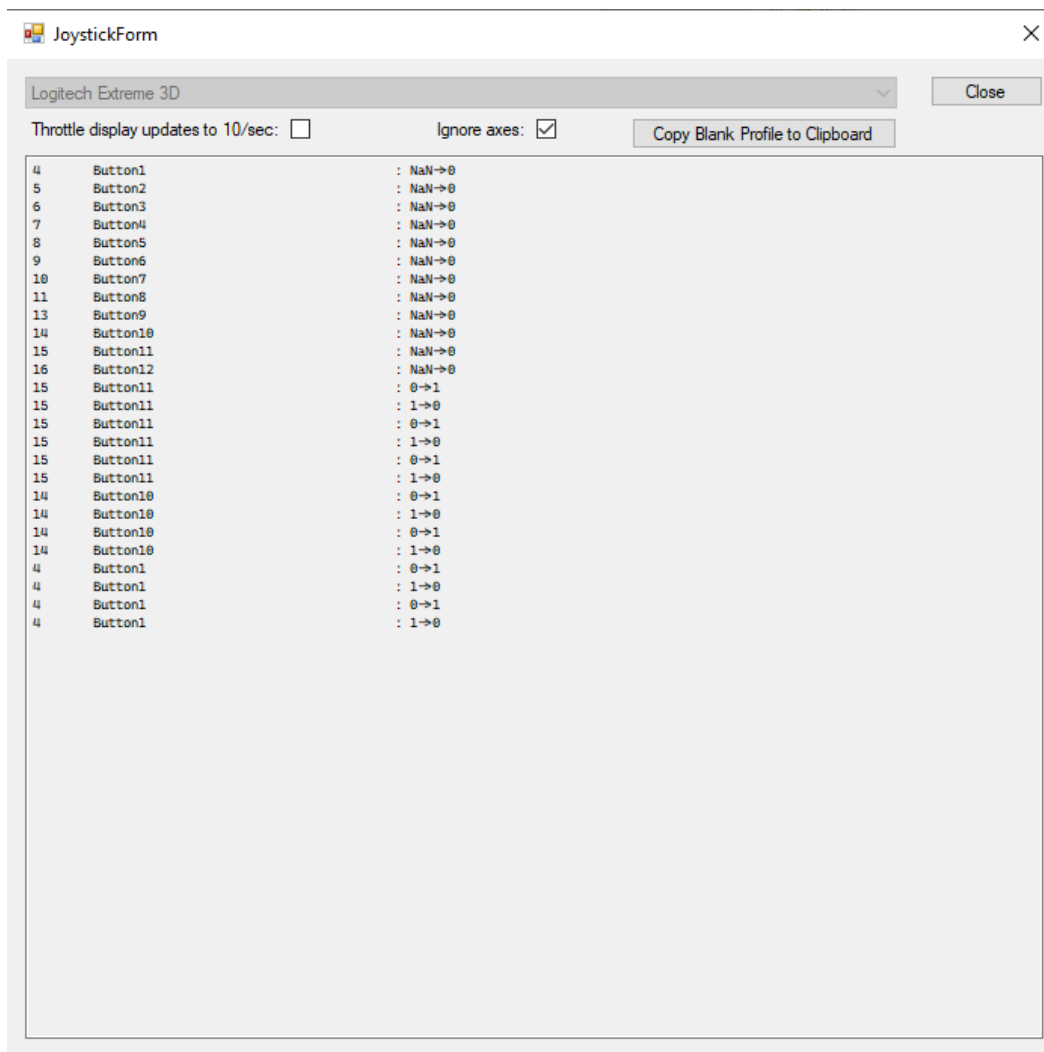

To enable a joystick profile select its name in the "Enable Joystick Mappings" sub-menu. To enable a different profile you first must select the current profile to un-tick it, and then select the new profile you wish to activate.

The app will remember the last profile in use and will reload this profile when restarted.

The "Joysticks…" menu option will open a joystick diagnostic window which will allow you to examine the HID events reported by the system for the selected joystick.   You cannot close the window or select a different joystick until you close the currently selected Joystick by clicking the "Close" button.

The HID event names reported in this window are what is required in the XML configuration file which details the mappings for each joystick. You can set up your own custom mappings by editing this file using any text editor. The file is called JoystickMappings.xml and must be in the same folder as the application executable file.

There are two profiles provided for the Bravo, Default and Extra.

Default is a simple configuration that simply maps all the Toggle Switches, the rotary 5-way switch and the Gear Lever to SimConnect events. This will stop the 10deg and 1000ft bug but won't provide any additional functionality. **To use this profile you need to remove all the in-game mappings for the rocker switches, the rotary 5-way switch, the Gear Lever and the INC/DEC knob. Failure to do this will not fix the bug and may provide unpredictable behaviour.**

The following toggle switch mappings are made in the Default profile.

Switch 1	Not mapped
Switch 2	Not mapped
Switch 3	Landing Lights
Switch 4	Taxi Lights
Switch 5	Nav Lights
Switch 6	Strobes
Switch 7	Pitot Heat

Extra is a complex configuration that does all the above as well as a lot more besides.
This configuration utilises the two left hand toggle switches as a combined mode selector providing four different modes of operation.

N.B. The Extra profile requires that the MobiFlight WASM module is installed to the Community folder and running correctly and none of this extra functionality will be available without it. Instructions for getting and running this module can be found at this link https://pastebin.com/fMdB7at2.

To use this profile you need to remove all the in-game mappings for the rocker switches, the rotary 5-way switch, the Gear Lever, all the push buttons and the INC/DEC knob. Failure to do this will not fix the bug and may provide unpredictable behaviour.

With release 0.6.0 this profile controls both the G-1000 and GNS 530/GNS 430 at the same time.   That is events for each GPS unit are sent for each joystick event. This is possible because the sim will simply ignore any events for units that are not installed in the current aircraft.

 Mode one is both switches off (down). This mode provides the same AP mapping as the default configuration.

Mode two is left switch on (up) and right switch off (down). This mode changes the function of the rotary switch and push buttons to adjust the PFD NAV and COM radio controls.

Mode three is left switch off (down) and right switch on (up). This mode lets the rotary switch and push buttons adjust the G1000 PFD controls.

Mode four is left switch on (up) and right switch on (up). This mode lets the rotary switch and push buttons adjust the G1000 MFD controls.

Toggle Switch Positions	Mode	Mode Description
Sw 1 Dn + Sw 2 Dn	Mode 1	Auto Pilot
Sw 1 Up + Sw 2 Dn	Mode 2	Radios
Sw 1 Dn + Sw 2 Up	Mode 3	G1000 PFD / GNS530
Sw 1 Up + Sw 2 Up	Mode 4	G1000 MFD / GNS430

The details for each of these modes are in the following tables.

These tables show which in sim rotary knobs are affected by the Bravo INC/DEC knob.

G-1000

Mode	5 Way Rotary Switch Position				
	IAS	CRS	HDG	VS	ALT
Mode 1	IAS	CRS	HDG	VS	ALT
Mode 2	PFD NAV	PFD COM			
Mode 3	PFD FMS	PFD RNG	PFD CRS/BARO		
Mode 4	MFD FMS	MFD RNG	MFD CRS/BARO		

GNS 530 / GNS 430

Mode	5 Way Rotary Switch Position				
	IAS	CRS	HDG	VS	ALT
Mode 1	IAS	CRS	HDG	VS	ALT
Mode 2	GNS530 Left	GNS430 Left			
Mode 3	GNS530 Right				
Mode 4	GNS430 Right				

Note that whenever one of the Sim Dual-Concentric knobs is being adjusted then it is the small inner knob that receives the events. To adjust the large outer knob you need to hold the flaps lever up while turning the INC/DEC knob.
You need to be aware that this will also send the real flaps up event so be careful when you have modes 2, 3 or 4 selected and only use these modes when you don't need the flaps extended.

There is an acceleration function built in to the SimConnect code that is utilised by both profiles.
When adjusting the ALT, HDG and CRS the number of pulses sent to the sim varies depending on how fast the INC/DEC knob is turned. If the knob is turned slowly then the normal 1 pulse is sent to the sim for each click of the knob. If the knob is turned fast enough then 10 pulses are sent to the sim for each click of the knob.
This allows a rough value to be quickly dialed in before fine tuning to the desired value.

These tables shows which in sim buttons are clicked when one of the Bravo push buttons is pressed.

G-1000

Push Buttons	Mode			
	Mode 1	Mode 2	Mode 3	Mode 4
HDG	HDG		PFD Softkey 6	
NAV	NAV		PFD CLR	MFD CLR
APR	May		PFD FPL	MFD FPL
REV	REV		PFD PROC	MFD PROC
ALT	ALT		PFD]→	MFD]→
VS	VS		PFD MENU	MFD MENU
IAS	VS	See Table 2	PFD ENT	MFD ENT
AUTO PILOT	See Table 1	See Table 1	See Table 1	See Table 1

Table 1

Mode	5 Way Rotary Switch Position				
	IAS	CRS	HDG	VS	ALT
Mode 1	AUTO PILOT	AUTO PILOT	AUTO PILOT	AUTO PILOT	AUTO PILOT
Mode 2	PFD NAV Push	PFD COM Push			
Mode 3	PFD FMS Push	PFD Joystick Push	PFD CRS Push		
Mode 4	MFD FMS Push	MFD Joystick Push	MFD CRS Push		

Table 2

Push Buttons	5 Way Rotary Switch Position				
	IAS	CRS	HDG	VS	ALT
HDG					
NAV					
APR					
REV					
ALT					
VS					
IAS	PFD NAV Swap	PFD COM Swap			

GNS 530 / GNS 430	Mode			
Push Buttons	**Mode 1**	**Mode 2**	**Mode 3**	**Mode 4**
HDG	HDG		GNS530 MSG	GNS430 MSG
NAV	NAV		GNS530 CLR	GNS430 CLR
APR	May		GNS530 FPL	GNS430 FPL
REV	REV		GNS530 PROC	GNS430 PROC
ALT	ALT		GNS530]↵	GNS430]↵
VS	VS	See Table 4	GNS530 MENU	GNS430 MENU
IAS	VS	See Table 4	GNS530 ENT	GNS430 ENT
AUTO PILOT	See Table 3	See Table 3	See Table 3	See Table 3

Table 3	5 Way Rotary Switch Position				
Mode	**IAS**	**CRS**	**HDG**	**VS**	**ALT**
Mode 1	AUTO PILOT	AUTO PILOT	AUTO PILOT	AUTO PILOT	AUTO PILOT
Mode 2	GNS530 Left Knob Push	GNS430 Left Knob Push			
Mode 3	GNS530 Right Knob Push				
Mode 4	GNS430 Right Knob Push				

Table 4	5 Way Rotary Switch Position				
Push Buttons	**IAS**	**CRS**	**HDG**	**VS**	**ALT**
HDG					
NAV					
APR					
REV					
ALT					
VS	GNS530 COM Swap	GNS430 COM Swap			
IAS	GNS530 NAV Swap	GNS430 NAV Swap			

Note that in modes 3 and 4 if you quickly press the CLR button then you will get a normal CLR event but if you press the CLR button for longer than 0.5s then you will get the Long CLR event which has the same effect as holding down the CLR button in the sim.

The following toggle switch mappings are made.

Switch 1	Mode Select
Switch 2	Mode Select
Switch 3	Landing Lights
Switch 4	Taxi Lights
Switch 5	Nav Lights
Switch 6	Strobes
Switch 7	Pitot Heat

Notes on the format of the JoystickMappings.xml file.

The file is mostly self explanatory however the following points may be of use.

There is no limit to how many joystick maps or profiles may be configured however each <Profile> "Name" must be unique and each <<Joystick> "MappingName" must be unique.

Each joystick device can have multiple mapping configurations.

The <Joystick> "Name" attribute must exactly match the device name as reported by the Joystick diagnostic window.

Each joystick map consists of one or more <JoyMap> elements and descriptions of the attributes possible in these elements is are follows:

JoyEvent=""	This is the name of the HID event as reported by the diagnostic window. It must be an exact match. This will usually be of the form ButtonNN but may be something else.
JoyEnableEvents=""	This is a comma separated list of joystick events that must be true in order for this map to be active. They are of the same format and must obey the same rules as JoyEvent.
SimEvent=""	This is the SimEvent that is sent on a normal joystick button press. Multiple events can be specified and if so they must be comma separated with no white space.
LongPushSimEvent=""	If specified, this event will be sent in lieu of SimEvent if the button is held down for longer than the "LongPressTimeout" attribute (milli seconds) specified in the top level <Joystick> tag. The same rules apply as for SimEvent.
SimVar=""	This is the name of a SimVar that is read from the sim data stream. It is used to determine the current state of an in sim control. This can be used with multi-state switches where only a toggle event can be sent to the sim. The code will read this SimVar to determine the current sim state. The SimEvent will only be sent if the SimVar value does not match the current state of the button. This matching is determined by the value of the ActiveState attribute. If the SimVar value is opposite to the ActiveState attribute then the SimEvent will be sent , otherwise nothing will be sent. Examples of how this is used can be seen in the "Bravo Throttle Quadrant – Default" joystick mapping, Button40 and Button41 mappings, there are other examples as well.
ActiveState="True"	Only used with the SimVar attribute, see description above.
ReleaseSimEvent=""	Normally a single set of events is sent for a button press and they are sent when the button is released. If this attribute is specified then two sets of events will sent for each button press, SimEvent will be sent on button press and ReleaseSimEvent will be sent on button release. The same rules apply as for SimEvent.

Notes on specifying SimEvents:
If a normal SimEvent is specified then it must match excactly one of the Enums in *Public Enum SimEventEnum* found in the file SimData.vb in the SimConLib folder of the source code.
It is also possible to specify a keystroke to send rather than a SimConnect event. This is done by using the form "KEY.<modifier_enum>.<key_enum>". These enums are found in the file SendInput.vb in the SimConLib folder of the source code. For example to send the key stroke ALT-F you would specify SimEvent="KEY.ALT.KEY_F".

If there are several maps that match a particular combination of buttons then the one with the highest number of JoyEnableEvents will take priority. This allows for combinations such as event1 for Button1, event2 for Button1+Button2, event3 for Button1+Button2+Button3 etc.