



Ruscool 64 IO Config

Version 1.0

User Manual

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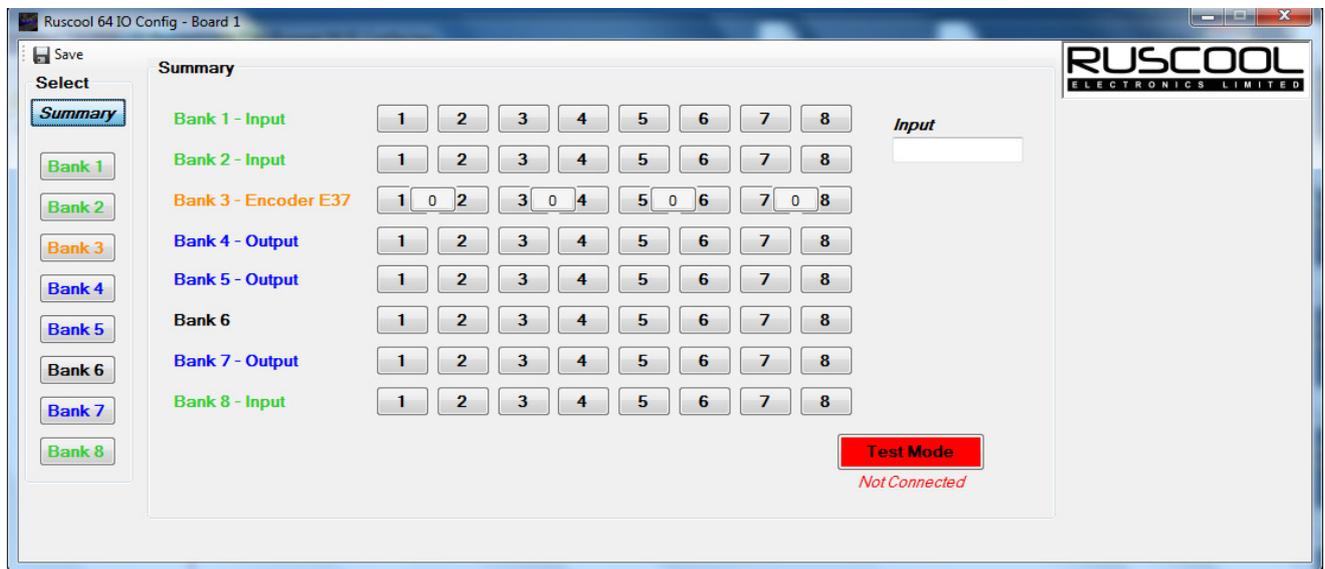
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Configuration Summary

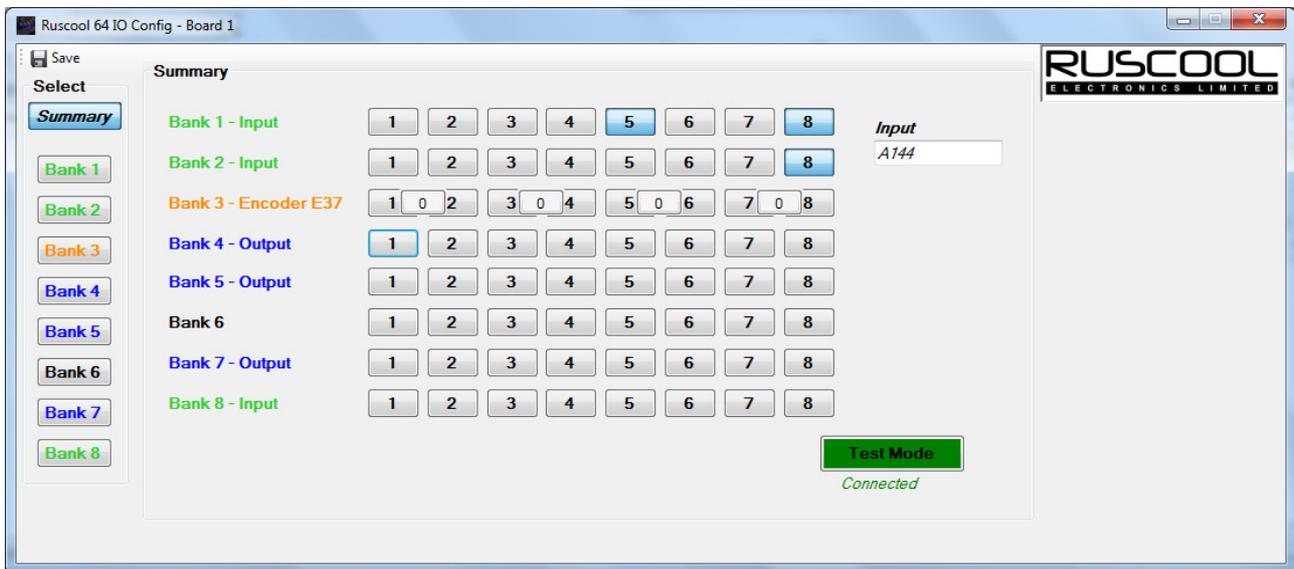
Running the **Ruscool 64 IO Config** program allows the user to set up all of the functions required for the circuit board. The circuit board is separated into eight banks, and each bank can be either 8 x Inputs/4 x Encoders or 8 x Outputs to enable the use of readily available CAT5 cables.

Note: if you are running multiple boards, you will need to run this setup for each connected board. See the [Running Multiple Boards](#) section for more information.

The Summary page shows how each of the banks are set up and allows the user to test to make sure everything is working correctly before running the main **Ruscool 64 IO** program. The Test mode does not interact with the Flight Simulator software, but will allow checking of the wiring for inputs, encoders, and outputs.



To enable testing, click on the **Test Mode** button. The button will turn green and show connected if a successful connection is made to the circuit board.



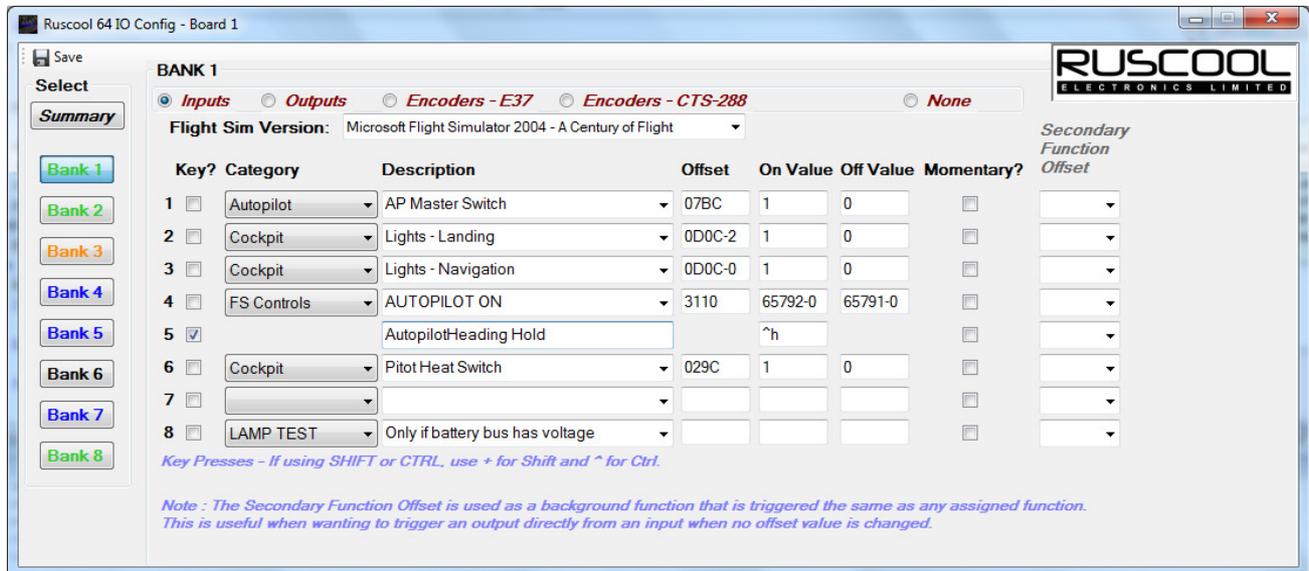
To test the outputs; click on the relevant button on the screen and you will see the physical LED light up.

To test the encoders; turn the physical encoder and you will see the relevant counter change along with the encoder, as well as seeing the value that is being received from the circuit board (in the Input box)..

To test the inputs; switch/press the physical switch or pushbutton and you will see the button on the screen light up as well as seeing the value that is being received from the circuit board (in the Input box).

Input Setup

To setup the input banks, click on the relevant bank number on the left-hand side. Then select 'Inputs' from the top options.



The **Ruscool 64 IO** board will handle standard offsets as well as other items that the FSUIPC offset list doesn't handle. You can use any of the FS Event Controls that can be configured within the FSUIPC module in Flight Sim and access them directly through this program without assigning them inside the Flight Sim program. These are 65xxx numbers, and a list is included within this program. Alternatively, you can use the 'Create Mouse Macro' or 'Key Presses' options in FSUIPC, and use a mouse click on the screen to be controlled by a keypress combination (ie Ctrl-y) to operate this function. Using our **Ruscool 64 IO** software, you can now have one of your physical buttons (connected to the board) simulate this keypress combination when you press it (or any other keypress combination assigned inside the flight sim program).

Select the version of Flight Simulator that you are using, or manually type the full program name, as this is used for key emulation purposes. (If you are not using Key Presses, this can be left blank)

Key Emulation

- Tick the "Key?" checkbox if the switch is to emulate a key press within Flight Sim.
- Manually type the "Description" to identify the switch for yourself.
- Enter the "On Value". If the CTRL key is to precede the keypress, press the ^ key and then press the required key(s) or + if the SHIFT key is to precede the keypress (eg CTRL-Y would be ^Y). If using function keys, type the function key name inside curly brackets (eg Home key would be {HOME}).

FSUIPC Selection

- Click on the “Category” drop-down and choose the item required.
 - If you don’t know which category the item is related to, you can choose (All).
 - If the offset isn’t listed, you can select “-CUSTOM” and enter your own details.
 - To select an FS control, select “-FS CONTROLS” from the drop-down and another screen will pop up, allowing you to select the action from a list. If you are using a control that ends with “SET” you will need to enter a parameter, otherwise it will default to zero. If you only have one required action, select it from the “ON” section only and leave the “OFF” section blank.
 - Select ‘RESET WARNING’ to link the switch to any output warnings that have been set up.
 - Select ‘LAMP TEST’ to make the switch control the outputs for lamp testing.
- If you are using a standard offset, click on the “Description” drop-down and choose the item required. The program will show you the “Offset” and the “Bytes” as used by FSUIPC. You will also see above that some of the FSUIPC offsets (ie. the different Lights) have a suffix after the offset value, and this is automatically catered for in this system.
- Enter the “On Value” and “Off Value” if these fields are not automatically populated from the Description or other screen.
- You can specifically assign a switch as a momentary pushbutton, otherwise the switch will be treated as a static switch.

In most situations, it is not necessary for the user to fully understand how FSUIPC works with MS Flight Simulator, but sometimes it is useful to know what sort of values are required in the On and Off.

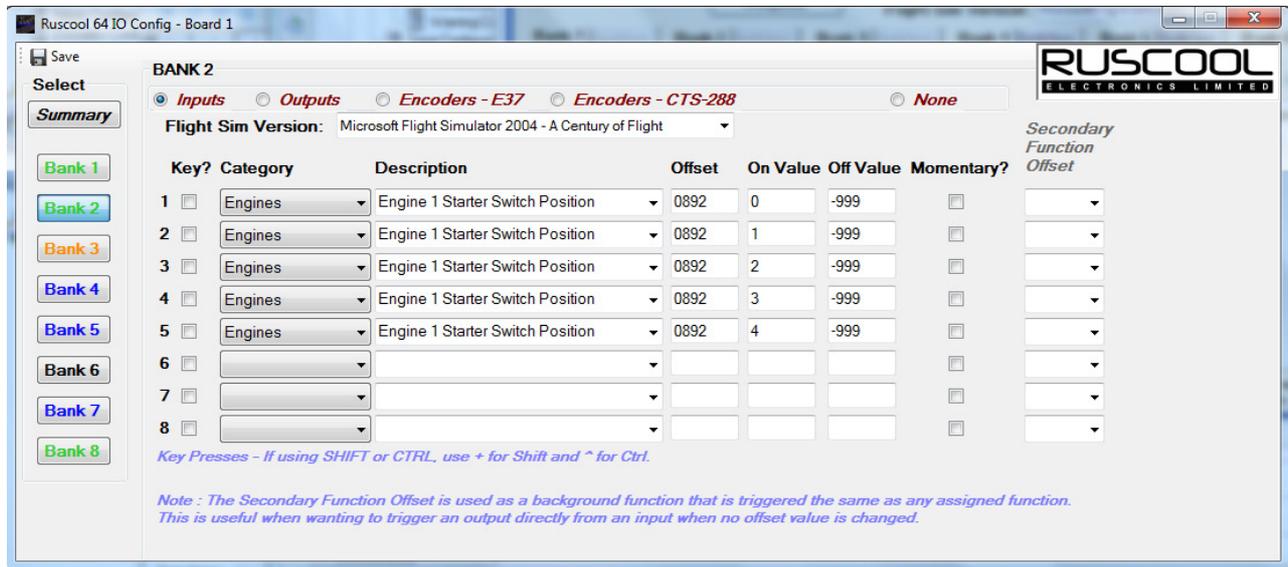
When selecting the description, the appropriate “1” and “0” (or relevant values) will pop up in the On Value and Off Value boxes. If these boxes are not filled in automatically, it is essential to type in the appropriate information by hand.

You can reverse the function of the On and Off conditions by changing the “1” to a “0” and the “0” to a “1”. (The same applies to any other value pairing)

A further example is when an MS Flight Simulator function generates a different number depending on the position of a switch. An example would be using two switches to perhaps drive the engine starter switch, one for the GEN position and another for the START position.

It is essential that the “On Value” and “Off Value” boxes have values in them as appropriate to the switching function, or else that particular line will not be saved in the configuration file. If using FS Controls, these values should not be manually changed - select “FS Controls” again from the category drop-down to alter your selection.

Some cockpit switches may be multi-position rotary switches (such as Auto-Brake selector, and Mag / Starter switch). These types of rotary switches can be connected to any bank, and they need an "Off Value" of -999. This means that now the Flight Simulator program will only be sent the "On Value" that you type into the box. The example below shows the Engine Starter Switch positions that the rotary switch would use. You can manually type the extra details after the description so that it is easier to keep track of what each switch does.



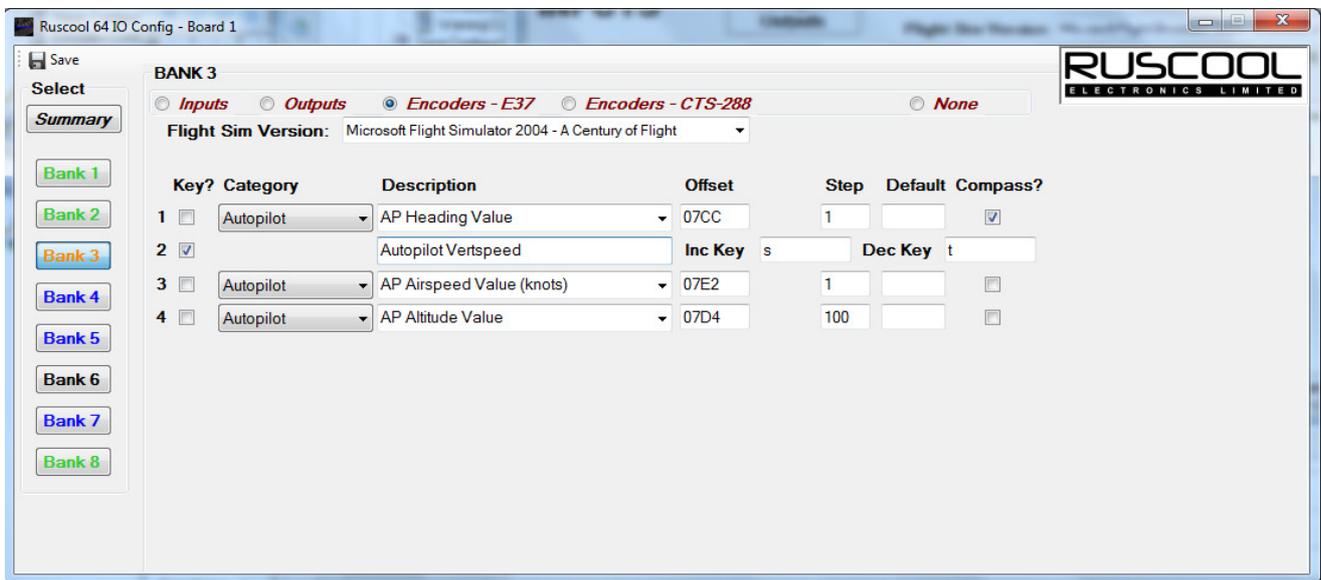
It is not necessary to use every input in each bank, so they can just be ignored if they are blank. However, if they have been previously configured and you now want them to be unused, make sure "Key?" is deselected and select (None) from the "Category" drop-down.

Encoder Setup

To set up the encoder banks, click on the relevant bank number on the left-hand side. Then select either 'Encoders - E37' or 'Encoders - CTS-288' from the top options, depending on what type of encoder you have connected. Encoders can then be setup in the same way as the switch configuration.

The 'Step' value relates to the value that the encoder will increment/decrement on each click of the encoder.

When using offsets, if the encoder is operating a function that loops from 0 to 360, then it is important to tick the 'Compass?' option so that the calculation works correctly when passing this point.

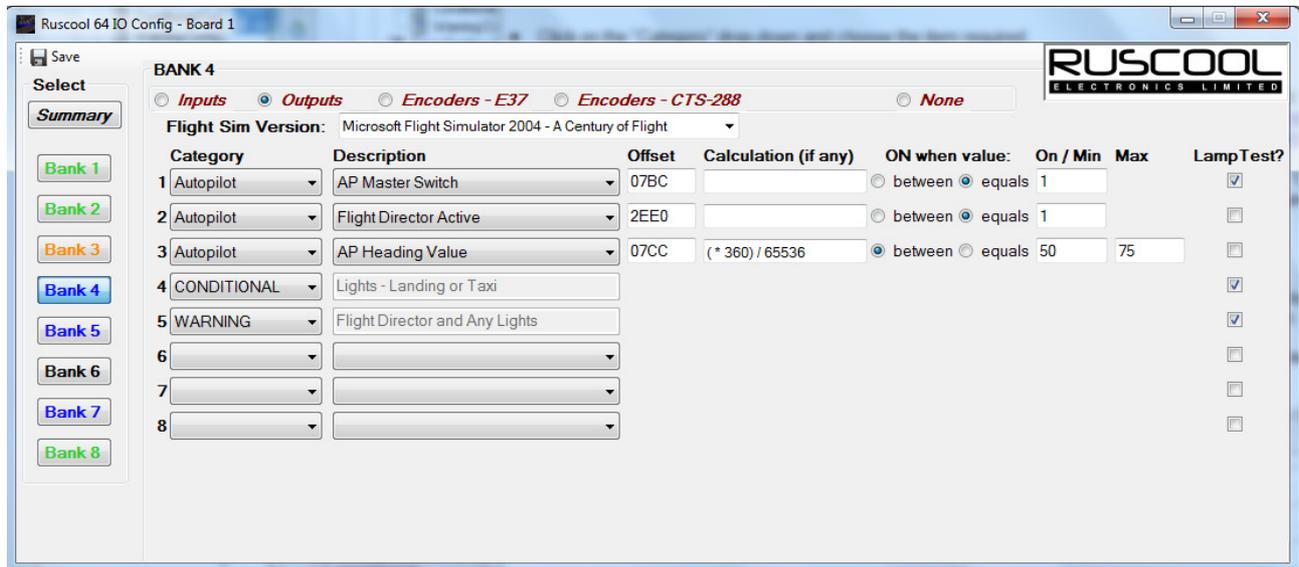


If using Key Emulation, you will need to enter the key(s) used for both incrementing and decrementing.

Note: If the CTRL key is to precede the keypress, press the ^ key and then press the required key(s) or + if the SHIFT key is to precede the keypress (eg CTRL-Y would be ^Y). If using function keys type the function key name inside curly brackets (eg Home key would be {HOME}).

Output Setup

To set up the output banks, click on the relevant bank number on the left-hand side. Then select 'Outputs' from the top options.



- Click on the “Category” drop-down and choose the item required.
 - If you don't know which category the item is related to, you can choose (All).
 - Selecting -CUSTOM will allow you to enter your own offset details.
 - Selecting -CONDITIONAL allow you to set up multiple conditions for an output (see [Conditional Configuration](#) section).
 - Selecting -WARNING allows a large range of OR conditions and can be reset from an input (see [Warning Configuration](#) section)
- Click on the “Description” drop-down and choose the item required. The program will show you the “Offset” as used by FSUIPC. You will notice that some FSUIPC offsets (ie. the different lights) have a suffix after the offset value, and this is automatically catered for in this system.

Where FSUIPC does a calculation on the data, this is shown in the "Calculation (if any)" column.

It is not necessary to use every output in each bank, so they can just be ignored if they are blank. However, if they have been previously configured and you now want them to be unused, you must select (None) from the Category drop-down.

You can also set an input to act as a lamp test and selecting which outputs are to be controlled by this lamp test. (see [Lamp Test Configuration](#) for further details)

In most situations, it is not necessary for the user to fully understand how FSUIPC works with MS Flight Simulator, but sometimes it is useful to know what sort of values are required in the "On/Min" and "Max" boxes.

See additional topics:

['Equals' and 'Between' Functions](#)

'Equals' and 'Between' Functions

EQUALS EXAMPLE

If the item chosen has an ON / OFF function, like the "AP Master Switch" for instance, click on the 'equals' button and the appropriate "1" (or relevant value) will pop up in the On/Min box. If this box is not filled in automatically, it is permissible to type in the appropriate information by hand.

You can reverse the function of the 'equals' conditions by changing the "1" to a "0". (The same applies to any other value pairing)

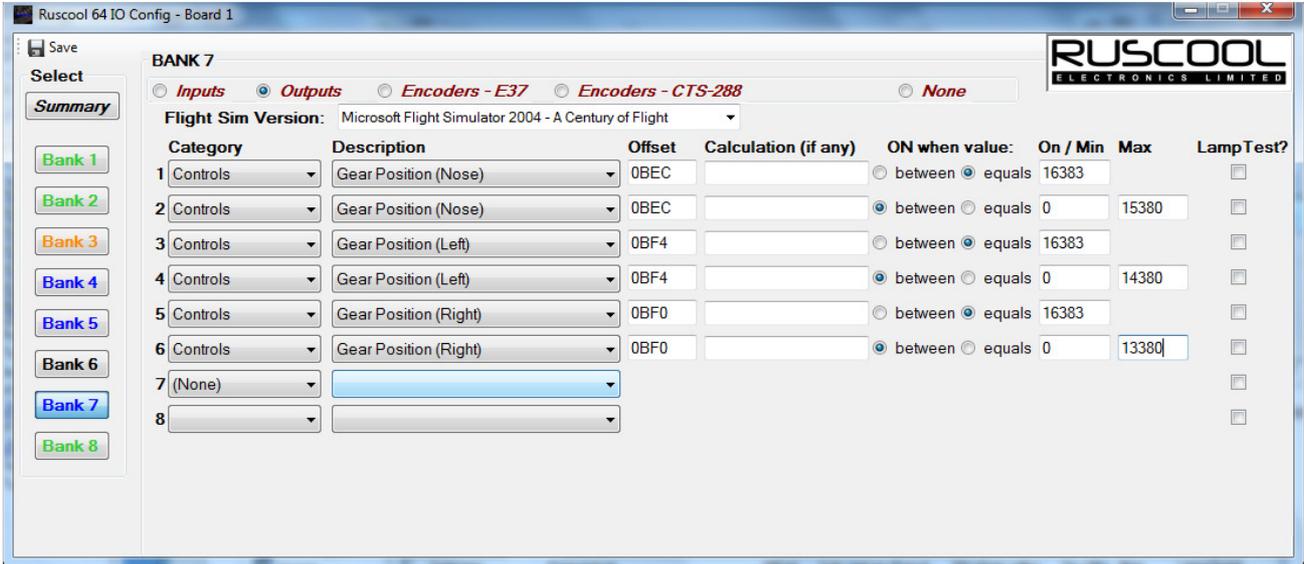
When you choose to use an 'equals' function, the output will go On at the number typed into the box, otherwise it is off.

A further way to use this technique is when an MS Flight Simulator function generates a different number depending on the position of a switch. An example would be using two outputs to perhaps drive two different lights that would show when the engine starter switch is in the GEN position or in the START position.

Category	Description	Offset	Calculation (if any)	ON when value:	On / Min	Max	Lamp Test?
1	Engines	0892		between equals	1		<input type="checkbox"/>
2	Engines	0892		between equals	2		<input type="checkbox"/>
3							<input type="checkbox"/>
4							<input type="checkbox"/>
5							<input type="checkbox"/>
6							<input type="checkbox"/>
7							<input type="checkbox"/>
8							<input type="checkbox"/>

BETWEEN EXAMPLE

You can click on the 'between' button and then type values in the On/Min and Max boxes (as shown for the Gear Positions below).



By using a range of numbers (and by using different numbers assigned to the same Offset as shown above) it is possible, for example, to set up a red and green light for each wheel on a Boeing 737 aircraft.

This example on Bank 7 will light a green light on outputs 1, 3 and 5 for when the gear is down and locked, and will light a red light on outputs 2, 4 and 6 for when the gear is in transition. All red and green lights will go out when the gear is up and stowed.

By altering the numbers in the On/Min and Max boxes, you can effectively change the time at which the red and green lights turn on and off.

When you choose to use a 'between' function, the outputs will go On between the two values or equal to the values, and will be Off when outside the values.

Conditional Configuration

You are able to configure multiple conditions to control each output, if required. You can have a combination of conditions grouped together, and there is also an 'or' section that allows you to have one of two separate condition arguments implemented.

Type in the Description for the output; this will help identify the output within the configuration and also when the main program is running. Then you will need to enter the relevant conditions that will control the output ON status.

The example below turns the Rotor Low RPM output ON when the Rotor RPM % is between 0 and 90 OR the combustion flag is off. (eg. the only time it will be OFF is from 91-100% and the combustion flag is on) This example is suitable for a 'Low Rotor RPM' annunciator in a helicopter.

	Category	Description	Offset	Type	Calculation	ON when value:	On / Min	Max
IF	Engines	Engine 1 Rotor RPM % (helo)	0908	Int32	*100/16384	<input checked="" type="radio"/> between <input type="radio"/> equals	0	90
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
OR	Engines	Engine 1 Combustion Flag	0894	Short		<input type="radio"/> between <input checked="" type="radio"/> equals	1	
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
OR						<input type="radio"/> between <input type="radio"/> equals		
OR						<input type="radio"/> between <input type="radio"/> equals		

The example below turns the Taxi Light output ON when the gear control is up and either the taxi or landing light is on. (eg. The taxi light is on and the gear control is up OR the landing light is on and the gear control is up) This example is suitable for a warning annunciator on an aircraft where the taxi light is mounted on the nose gear.

	Category	Description	Offset	Type	Calculation	ON when value:	On / Min	Max
IF	Cockpit	Lights - Landing	0D0C-2	Short		<input type="radio"/> between <input checked="" type="radio"/> equals	1	
and	Controls	Gear Control	0BE8	Int32		<input type="radio"/> between <input checked="" type="radio"/> equals	0	
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
OR	Cockpit	Lights - Taxi	0D0C-3	Short		<input type="radio"/> between <input checked="" type="radio"/> equals	1	
and	Controls	Gear Control	0BE8	Int32		<input type="radio"/> between <input checked="" type="radio"/> equals	0	
and						<input type="radio"/> between <input type="radio"/> equals		
and						<input type="radio"/> between <input type="radio"/> equals		
OR						<input type="radio"/> between <input type="radio"/> equals		
OR						<input type="radio"/> between <input type="radio"/> equals		

To get back to the Conditional setup, reselect '-CONDITIONAL' in the Category dropdown and this screen will appear.

The example below will light the warning output if the Battery Switch AND Avionics Switch are 'On', and **ANY** of the other conditions are true.

Warning Conditions

Save Exit Name: Assorted Warning Flashing Static

Category	Description	Offset	Type	Calculation	ON when value:	On / Min	Max
AND	Controls	Battery Switch	3102	Byte		<input type="radio"/> between <input checked="" type="radio"/> equals	1
	Controls	Avionics Switch	3103	Byte		<input type="radio"/> between <input checked="" type="radio"/> equals	1
THE ABOVE ARE TRUE (IF ENTERED) AND ANY ONE OF THE FOLLOWING CONDITIONS ARE TRUE							
OR	Engines	Engine 1 Combustion Flag	0894	Short		<input type="radio"/> between <input checked="" type="radio"/> equals	0
	Engines	APU on Fire Flag	0853	Byte		<input type="radio"/> between <input checked="" type="radio"/> equals	1
	Fuel	Engine 1 Fuel Valve	3590	Int32		<input type="radio"/> between <input checked="" type="radio"/> equals	0
	Fuel	Fuel Centre Tank 1 Level (%)	0B74	Int32	*100/(128*65536)	<input checked="" type="radio"/> between <input type="radio"/> equals	0 10
	Fuel	Fuel Centre Tank 2 Level (%)	1244	Int32	*100/(128*65536)	<input checked="" type="radio"/> between <input type="radio"/> equals	0 10
	Fuel	Fuel Centre Tank 3 Level (%)	124C	Int32	*100/(128*65536)	<input checked="" type="radio"/> between <input type="radio"/> equals	0 10
	Pos./Attitude	Angle Of Attack - %	11BE	Short	100-(100*/32767)	<input checked="" type="radio"/> between <input type="radio"/> equals	25 50
	Engines	Turbine Engine 1 Vibration	2084	Double		<input checked="" type="radio"/> between <input type="radio"/> equals	2 10
	Cockpit	Avionics Bus Voltage	2850	Double		<input checked="" type="radio"/> between <input type="radio"/> equals	0 22
	Cockpit	Battery Bus Voltage	2870	Double		<input checked="" type="radio"/> between <input type="radio"/> equals	0 22
	Cockpit	Battery Bus Amps	2878	Double		<input checked="" type="radio"/> between <input type="radio"/> equals	25 50
OR						<input type="radio"/> between <input type="radio"/> equals	
OR						<input type="radio"/> between <input type="radio"/> equals	
OR						<input type="radio"/> between <input type="radio"/> equals	
OR						<input type="radio"/> between <input type="radio"/> equals	
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OR						<input type="radio"/> between <input type="radio"/> equals	
OR						<input type="radio"/> between <input type="radio"/> equals	

To get back to the warning setup, re-select '-WARNING' in the Category dropdown and this screen will appear.

Save Configuration

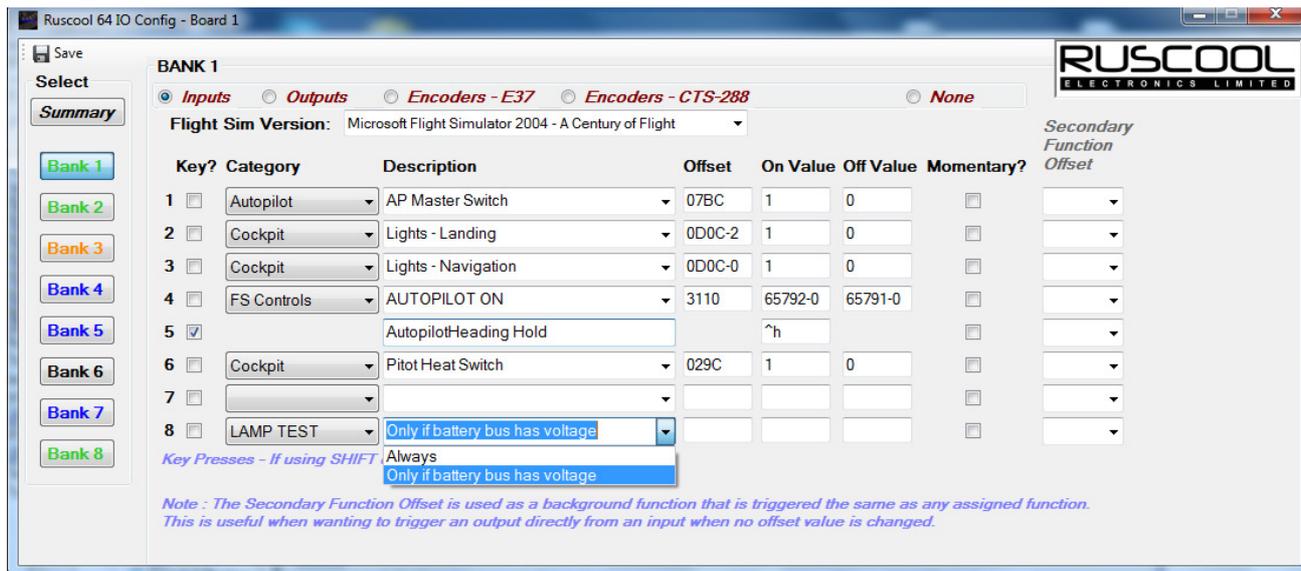
The system **does not** automatically save your changes, so it is necessary to press the "Save" button in the top left-hand corner if you wish to save your changes before you exit the program.

Pressing the "Exit" button will shut down the **Ruscool 64 IO Config** program without saving any changes.

Lamp Test Configuration

Instead of physically wiring up all of your lights and annunciators to a Lamp Test switch, we have incorporated a simpler solution.

You can choose to connect a Lamp Test 'switch' that will act as a trigger for a lamp test. You can also specify that you only want the lamp test to be triggered when the battery bus has voltage by selecting that option from the dropdown, which looks at the value in offset 2870.



Then any relevant outputs can be ticked to be included in the lamp test.

These outputs will be turned ON whenever the lamp test switch is ON.

Running Multiple Boards

To enable more than one **Ruscool 64 IO** board to work, you can create two additional desktop shortcuts from the "C:\Program Files\Ruscool Electronics Ltd\Ruscool 64 IO" directory (or the directory where you installed the program when running the setup). These shortcuts should be named "Ruscool 64 IO 2" and "Ruscool 64 IO Config 2" or something similar which will help to identify them in the future.

To enable these new shortcuts to communicate to the additional setups and circuit boards, right-click on the shortcut and add a space and the board number to the end of the Target (outside the quotes). For example, if adding a second board the target should read

"C:\Program Files\Ruscool Electronics Ltd\Ruscool 64 IO\Ruscool 64 IO Config.exe" 2