

USING FSXpand WITH REMOTE JOYSTICK AXES,
BUTTONS and ON/OFF SWITCHES

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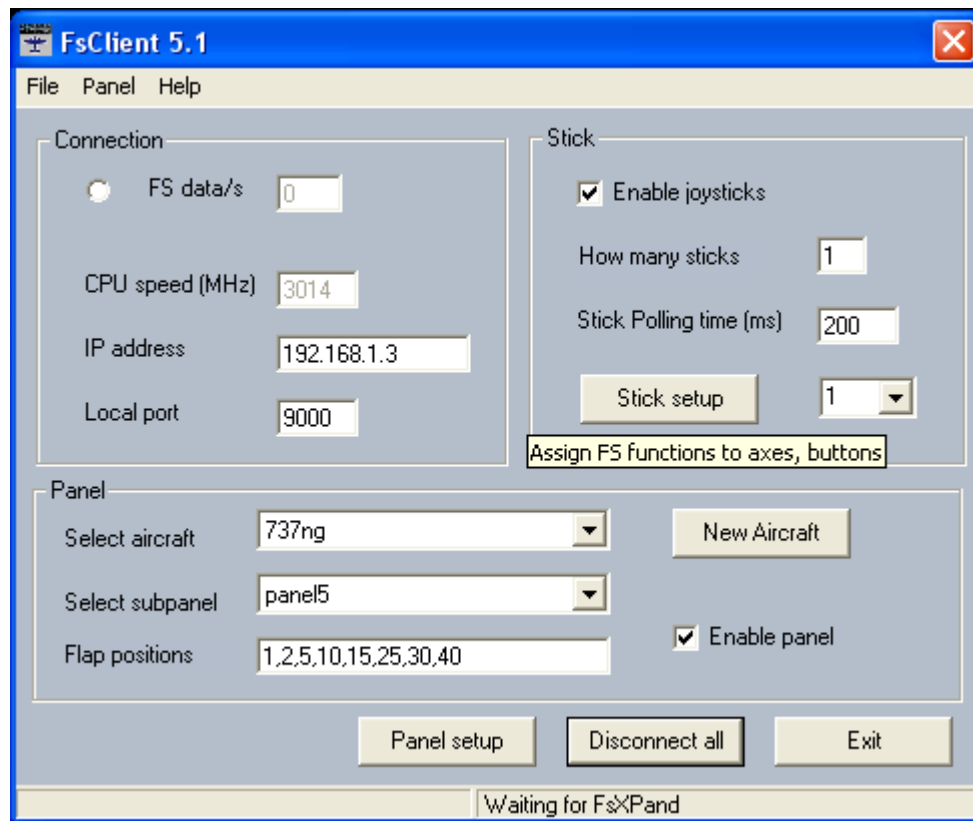
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FSXpand is the Brainchild of Gert Heijnis.
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FSXpand is basically a two part program. FSXpand being the server which is installed on the main FS machine and FSClient which is run as it's name implies on any networked computer or computers. It's prime use is to provide cockpit instrumentation on these networked computers. More information on instrumentation can be found at the FSXpand website at www.flyware.nl



FSClient Front Menu Screen

But apart from Instrumentation, FSXpand also allows the communication of joysticks connected either to the machine it is installed on or between any machine or machines that have FSClient installed which are resident on the same network.



FSClient can handle and communicate information from any Gameport or USB joystick that is attached to that computer. For the purpose of this document, I will be dealing with USB devices (because that's all I have). There is a circuit diagram of Gameport connections on the FSXpand Website for those who require that information.

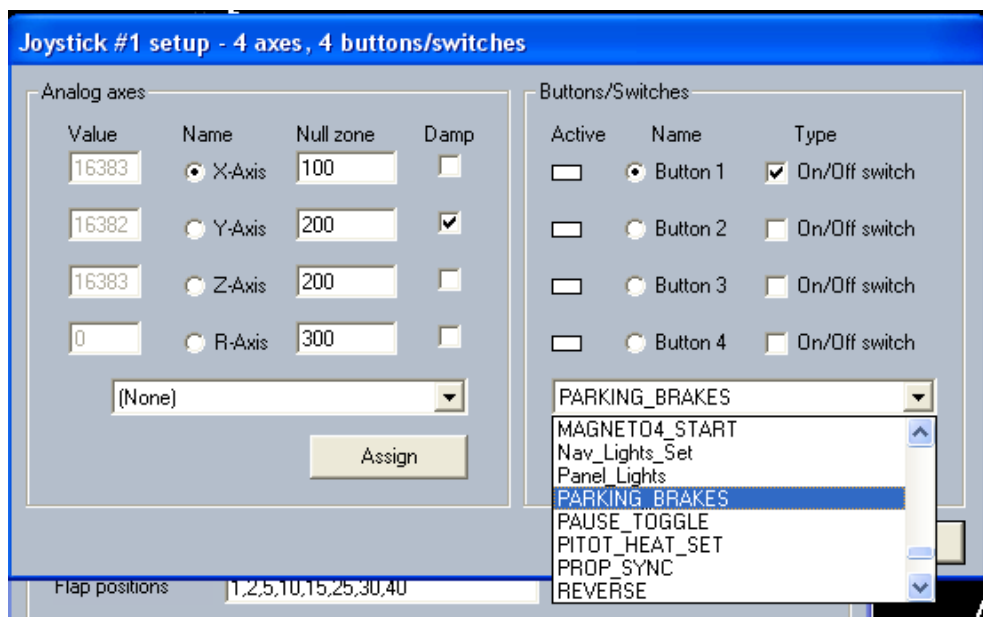
What we are going to do is Rip Out an old Joystick and convert it into Button, Switch and Lever or Rotary Controls by which we will control functions in FS2004 over the network using FSClient.

PREPARE YOUR JOYSTICK Ok so we are going to take apart (carefully) our old USB Joystick. Any basic joystick will contain a circuit board, several linear or rotary potentiometers (for elevators, ailerons and throttle) and some buttons. The joystick you see in the example is just that, I had an old Saitek USB stick which I ripped apart. Just 3 axes X, Y and Z (ailerons, elevator and throttle) and 4 buttons. It's the circuit board and wiring I'm interested in.

First positively identify which wires go to buttons and which wires go to variable pots and label them 'pot' or 'button'. Don't worry about button numbers or axis identification, FSClient will tell you which is which when you go to configure them.

SWITCHING.

There are two ways to send data from switches via FSClient to FS2004. You get to the assignment menu by clicking on the Stick Setup Button on the front Menu. You are then presented with the stick configuration menu screen like this.



Each of the Buttons on your stick will have a number starting at 1 and ending at whatever number of buttons you have e.g. if you have a 4 button stick the numbering will be 1 to 4. If You have an 8 button stick, it will be 1 to 8. The front menu shows buttons 1 to 4, but if you click on the More... button you will find you are able to configure higher number buttons (5+) on the next page.

Remember that most Joysticks use momentary push buttons to action a command.

Look at the right hand side of the menu and you will see the button configuration setup. Each Button Line shows you the Active state (white when open and red when closed), Button select indicator and Button No. There is also a Check Box to indicate whether you will use a pushbutton or an On/Off Switch.

Underneath these is the drop down menu for selecting which function you want to use with the selected button.

What I did was to wire an ON/Off Switch across the Button 1 wires. Selected Parking Brakes for this function and told FSClient it's a switch by ticking the check box.

Once your parameters are set, DO NOT FORGET TO CLICK THE ASSIGN BUTTON.

Now before connection, I tested the setup. When I turn the switch to the on position, the active light turns red. When I turn it off again, the Active Box reverts to white. So it works! Things to remember with switching.....

PUSHBUTTONS These just send a command once. Ideal for using on 'Toggle' commands or for sending a command to momentarily alter the state of some function on FS2004.

ON/OFF SWITCHES These change the state of a function in FS2004 and hold it in the changed state, either on or off. Ideal for things like Parking Brake, Landing Lights etc.

So from the above example, you can see that I have configured Button 1 as an ON/OFF switch and assigned it to the Parking Brake. So when I click the switch to the on position, the Parking Brakes are set ON. When I click the switch to the off position, the Parking Brakes are set OFF.

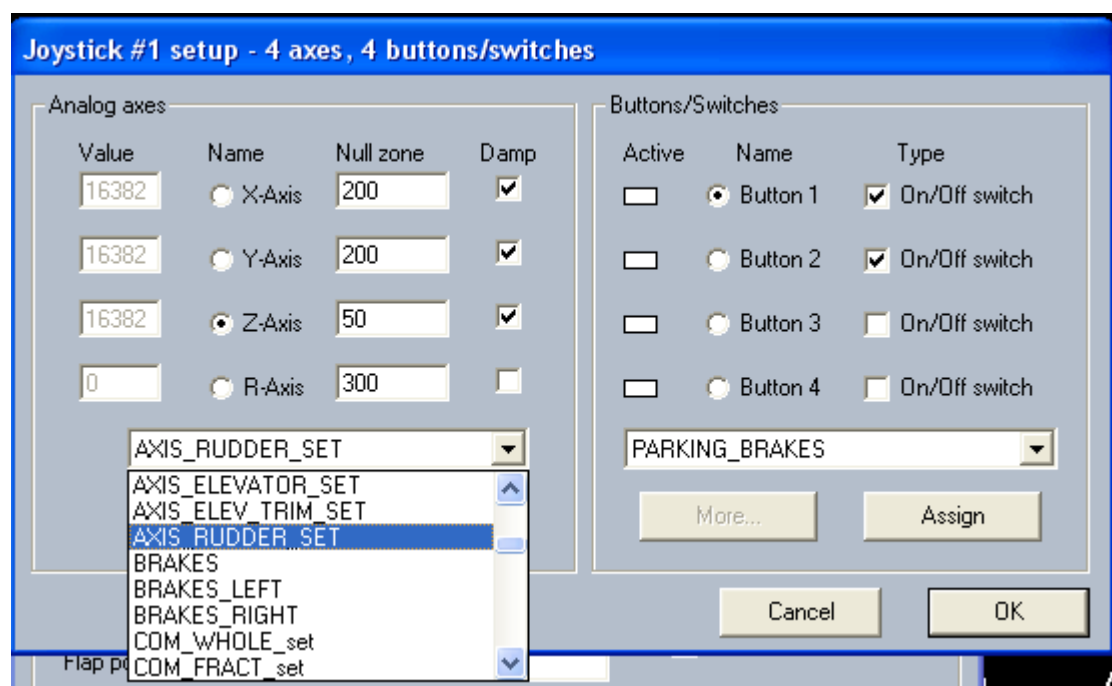
Button 2 is also an ON/OFF switch, set up identically and assigned to the Landing Lights.

Button 3 is a Pushbutton and assigned to Engine Start 1

Button 4 is also a Pushbutton and assigned to Engine Start 2

JOYSTICK AXES. FSClient has the ability to read Joystick axis and send the result to FS2004. There are several commands which can be controlled with the use of Joystick Axes. Normally your joystick will control Elevators, Ailerons and possibly a throttle and even rudders when connected directly to the FS2004 machine. However, what I did was to assign the axes to other functions because this joystick is attached to an FSClient machine.

Dealing with axes is a little more complicated than switches, but once you get your head round it, it's child's play.



Because we have 'ripped apart' an old joystick, we need to replace the variable pots in the stick with new ones. Generally joysticks use 100k linear pots which can be bought at any good electronics shop quite cheaply.

This is the symbol for a variable potentiometer. They usually have 3 wires attached. The centre one is called the wiper. As you rotate the shaft, the wiper moves along a track changing the resistance between the other two connections. It is this change that your computer reads thus causing the numbers to change in the value box.

The value is then sent to FS2004 to change the state of the controlled item.

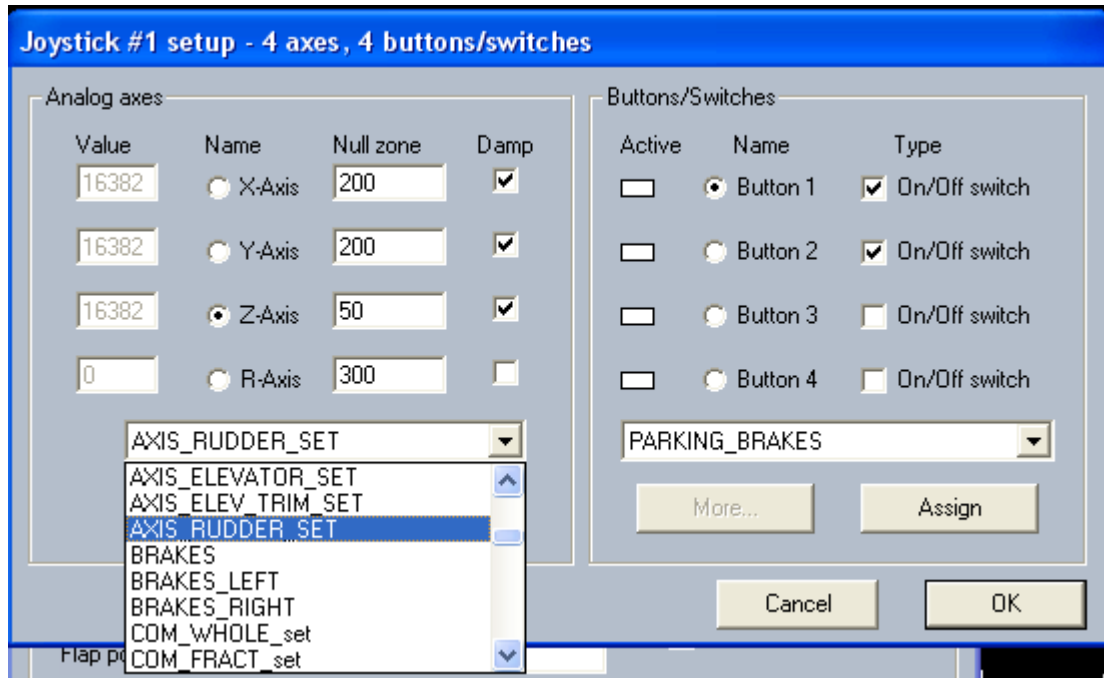
In this example, I used the Z axis and assigned it to the `AXIS_RUDDER_SET` function because I wanted to implement Ground Steering. I set the null zone at a lower value than normal because I wanted to detect changes faster on the axis.

You will also notice that the check box under Damp has been ticked. Analogue axes components are very inaccurate and can send 'control spikes' (split second increase or decrease of the resistance) thus causing fluctuation in the state of whatever you are trying to control. Damping stops this from happening.

Generally, variable pots have three connectors. It is usual that the wiper is attached to the centre pin unless of course you have a non-standard pot. The other two wires are connected to the outer pins. Not important at this stage which is which, but it will have a bearing later, so just 'tin' them on.

Now rotate your pot. You should see the numbers change in the value box. You do, great. That means your computer is reading the axis. Now repeat the exercise for each axis in turn and check operation.

You are now ready to assign the axes to functions to be sent to FS2004 by FSClient.



On this setup, I assigned the X axis to Eicas Panel Switching for the captain, the Y axis to the same function for the F/Officer and the Z axis to the AXIS_RUDDER_SET to facilitate Ground Steering.

You on the other hand may care to assign your axis to other functions. This facility is ideal for use with
 ELEVATOR TRIM
 FLAPS SETTING
 MIXTURE
 SPOILERS
 REVERSE THRUST

So select your axis, tick the Damp Box then goto the Drop Down Menu and select the function you want to assign to that axis. DO NOT FORGET TO CLICK THE ASSIGN BUTTON. Repeat the process for each axis you wish to configure.

Ok, so it all works. Remember we spoke earlier about connecting the outer wires on your pot. Well if you have to rotate your pot in the wrong direction to get the control moving, just simply swap the two outer wires and your control will operate in the other direction.

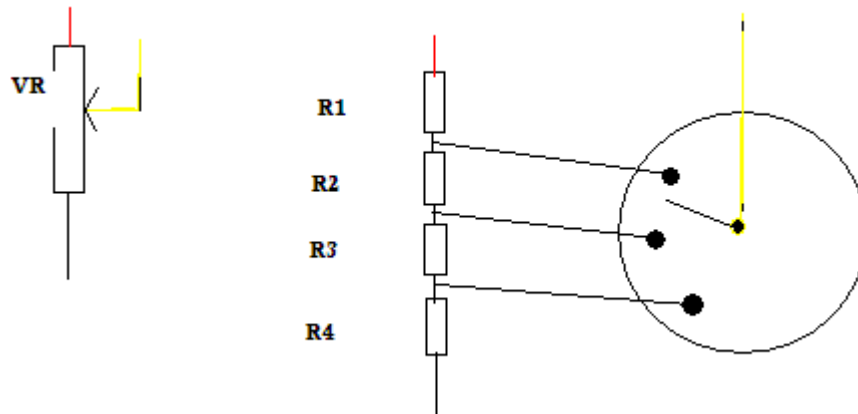
Please remember that not everybody wants the same functions for their setup, so think about what you want to do and go thru it step by step. FSClient is just the tool to make it happen, it gives you the ability to greatly expand your cockpit environment and it is only limited by your imagination.

ADVANCED SWITCHING OPTIONS Right then, so you've got the general idea. Now's the time to start getting brave. Remember we talked about the wiper when moved along the track in our potentiometer, it changed the resistance. So it then follows that at any given point on the track, a given resistance will occur. As you rotate the shaft of the pot, the resistance either increases or decreases dependant on which way you are rotating the shaft.

My thanks to Mark at H+H Video in Ellesmere Port for this. Mark taught me all about 'Laddering Resistors'. What this means is by soldering resistors across a Click Switch, we can emulate this changing resistance.

In simple terms (it's a little more complicated than this), say we have a 100k pot. So at one end there is no resistance and at the other there is 100kohm. So it follows that as we move the wiper, the resistance start to increase to 25k 50k 75k and then reaches 100k.

Now let's translate that onto a 'Click Switch'.



On the left is a normal Variable Pot. The Wiper is the Yellow Lead. On the right is the same setup using a Rotary Click Switch and Resistors wired across the contacts to simulate the change in resistance. When you rotate the click switch to the next position, you add another resistor to the chain thus changing the resistance and switching will occur. It's all clever stuff you know.