

FSUIPC4: Application interfacing module for Microsoft Flight Simulator X and Microsoft ESP, and Lockheed-Martin Prepar3D (1.4)

Flight Simulator Universal Inter-Process Communication 4
by Pete Dowson, © 9th September 2013

Support Forum: [Pete Dowson's Support Forum](http://www.petedowson.com/forums/FSUIPC4)



Version 4.92 of FSUIPC.dll

Note: All my Windows based software is always available in the latest versions from <http://www.schiratti.com/dowson>. (Selected modules are also available elsewhere).

This is *not* my web site (I have none) but the list is there courtesy of Enrico Schiratti

Assorted extras and interim updates will be available from the [Download Links](#) subforum in my Support Forum (link above)

Note for ESP and Prepar3D Users

FSUIPC4 supports ESP and Prepar3D version 1.4. Wherever you see “FSX” mentioned in this and the other FSUIPC documents, please accept that this includes these other two simulators.

Contents of package

As well as the document you are now reading, this package contains “**Install FSUIPC4.exe**” that will install the following parts in a **Modules** folder or **Modules\FSUIPC Documents** folder, both of which will be created if necessary, in your FSX (and/or ESP) folder(s):

FSUIPC4.dll	The FS module itself, version 4.92 (in the Modules folder)
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and these in the Modules\FSUIPC Documents folder:

FSUIPC4 User Guide.pdf	This document, in Adobe Acrobat format
FSUIPC4 History.pdf	A list of changes in each version (Acrobat format)
FSUIPC4 for Advanced Users.pdf	More technical information only (Acrobat format)
List of FSX Controls.pdf	FSX controls list (Acrobat format)
Offset Mapping for PMDG 737NGX.pdf	List of offsets to access 737NGX data
FSUIPC Lua Plug-Ins.pdf	Introducing the powerful Lua plug-in facilities
FSUIPC Lua Library.pdf	Documentation for the additional FSUIPC Lua libraries
Example Lua Plugins.zip	A zip file containing some short Lua examples
Lua license.pdf	A copy of the Lua licensing agreement
FSUIPC4 Offsets Status.pdf	Includes offset lists, for use in Offset controls and Lua plug-ins
SimConnectP3D.dll (Prepar3D only)	An FSUIPC-SimConnect interface specifically for Prepar3D.

For other bits and pieces, like TrafficLook and WeatherSet, please visit my Support Forum. You will also find interim versions and bug fixes there—well worth a regular scan. The link is shown above, in the subtitles.

If you want programming details you need to get the FSUIPC4 Developer Kit, (SDK). Currently this is composed of the FSUIPC SDK from <http://www.schiratti.com/dowson> plus supplementary documents and updates from the SDK link in the “**Updates ...**” Announcement on the Support Forum.

For changes since the previous version, please review the History document

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Introduction: what is FSUIPC4?

FSUIPC4 is a relatively new version of FSUIPC designed for FSX and its derivatives ESP and Prepar3D. The original version dates back as far as FS98 and was built using hooks and direct access into the FS code—FSUIPC3 is still like that, even with FS2004.

Although there are still a few (very few) hooks and direct references into FSX code, FSUIPC4 is actually built around the Microsoft interface named 'SimConnect'. This interface is used almost exclusively for its interactions with FSX.

The function of FSUIPC, now that developers have an official Microsoft interface they can use, is still twofold, as it has been over the many years. It is just that one side of it may see less application as time goes on. The two aspects are:

1. The provision of an interface to FSX and beyond for application programs and add-on aircraft which is compatible with that provided by previous FSUIPC versions for FS2000, FS2002 and FS2004 (and, if you go back to FS6IPC days, FS98). The advantage of this is that programs already working on FS2004 (say) should, if they use FSUIPC, work immediately with FSX (*if they don't, I want to know, please!*).

In time I would expect newer versions of FSUIPC-using application, and, indeed, complete new applications, to arise that interface to SimConnect directly. Hence, this part of FSUIPC4 is unlikely to see a great deal of new development (additional offsets and the like)—at least certainly not as much as has occurred in the past.

This aspect of FSUIPC4 is available to applications irrespective of the user's status. In other words, user purchase and registration of FSUIPC4 has no bearing on the local FSX PC support of FSUIPC-interfacing programs (*support for Networked clients of WideFS does however still need purchase of the WideFS key*).

2. The main part of FSUIPC4, and the one which actually justifies it as a payware add-on, are the user features which is the subject of this document. It is these features you get if you purchase a Key to register. As well as those facilities familiar to previous users, for programming buttons, axes and performing more precise joystick calibrations, the functions of the original AutoSave and GPSout modules are now part of the benefits of subscribing to FSUIPC4, and are built in facilities with on-line option setting.

Note that some of the main features of previous versions of FSUIPC, those for manipulating the weather, are still not all as useful as they were. This is because the SimConnect facilities for weather reading and writing are just not fully up to scratch. Some facilities have been provided and work well, notably wind smoothing, but please don't expect them all to be fully working—the visibility constraints and especially the graduated visibility are the main casualties.

Paying for FSUIPC Registration

Why should I pay for FSUIPC?

The short answer is that you do not have to. The registration by users of their copy of FSUIPC4 is not compulsory. Here are the pros and cons:

What you get if you don't pay:

- The ability to run all FSUIPC-dependent application programs. (Commercial and shareware products pay a fee or subscription. All genuine freeware programs get free access keys on application).

What you get if you pay:

- Facilities for joystick calibration, some fancy assignment capabilities, and button programming, all with aircraft-specific assignment capabilities so that you can do different things with the same controls on different aircraft.
- Key press programming facilities, also aircraft-specific if desired.
- A few frills like facilities to load Flights or Plans from *any* folder in reach of Explorer, keeping the FS time in sync with the system clock, pausing automatically after the flight is restored following a crash, extending battery life, throttle syncing, allowing intervening actions during pushback without losing direction selection, and others.

- Assorted weather filtering options—the most useful one probably being the wind smoothing, which helps to fix those disastrously swinging winds FSX still seems to be capable of delivering. Unfortunately the visibility facilities don't work correctly due to bugs in SimConnect.
- AutoSave options—to save a Flight regularly, as a background task so you can resume from a few minutes before in the event of a crash or a need to reproduce some problem.
- GPSout facilities: optional output of NMEA or AV400 sentences to mapping programs either via a serial port (COM) connection, or via WideFS.
- Full adaptability in myriads of ways via Macro files and Lua plug-ins. Lua is a very capable scripting language which is well supported in a Registered install of FSUIPC. Many things can be done very efficiently with Macros and Plug-ins which would otherwise necessitate full external application programs to achieve.
- Support from myself for any queries or problems arising from the use of FSUIPC, or identifiable as FSUIPC even when using an application. I would still expect the application developer to be the prime support for his own application, and it is easier for him to sort out FSUIPC interfacing problems with me rather than between the user and me, if you see what I mean.
- All this for at least the life of FSX *and any official updates*, provided I live that long. I do not promise to continue this into any new Flight Simulators, though. That would really be asking too much. However, your registration will certainly remain applicable for all version 4.xx releases.

How much do I pay? How do I pay?

For most folks there is only one place for payment and registration, and that is via SimMarket, at:

[FSUIPC4 purchase at SimMarket](#)

The pricing is as follows:

FSUIPC 4	EUR24.00 (+VAT where applicable)
WIDEFS 7	EUR24.00 (+VAT where applicable)
BUNDLE	EUR36.00 (+VAT where applicable)

Euros are stipulated because SimMarket operates in Euros. They accept other currencies, depending upon the payment method, but the price is always based on the Euro. Note that new European tax rules for Internet based sales came into force in June 2003 which means that EU purchasers also have to pay VAT (“Value Added Tax”), which will be at the rate of the supplying country—Germany, in this case.

A word about **WideFS7**: this is an extra facility within FSUIPC4, in the sense that the FSUIPC4 module contains the equivalent of “WideServer”, the Server part of the WideFS package. The Client part is the same as before, and downloadable separately in the usual WideFS.ZIP package. Just use the WideClient.EXE from the latest WideFS.ZIP but not the WideServer.DLL. The full WideFS documentation is also only in the WideFS.ZIP package. You use the same WideClient program on your client PCs no matter which version of FS you have on the Server PC.

Note that the WideFS part of FSUIPC4 has its own its own Logging, but its settings are in a section of the FSUIPC4.INI file. Once you have paid for and registered WideFS7 through the FSUIPC4 installer (as described below) you will be able to enable and disable it whilst running FSX. Each time you re-enable it the parameters from the INI file are re-read, so you can actually change things there without reloading FSX.

For details of the different ways of paying at SimMarket please see <http://secure.simmarket.com/paymentoptions.php>.

Installation

Before trying to install FSUIPC4 you must have actually run FSX at least once. If you have not yet run FSX, do so first. This is necessary because certain essential files are not created until you have done so. The same applies to ESP and Prepar3D.

Note that if you two or more of FSX, ESP and Prepar3D installed on your PC, the Installer will install FSUIPC4 in all of them. If you are a user of the now-discontinued ESPIPC.DLL you should delete that and its ancillary files from the ESP Modules folder, and remove the ESP entry from the DLL.XML file manually. The FSUIPC4 installer cannot clean up your earlier manual settings for ESPIPC.

The rest of this document will talk only about FSX, but please read that to also mean ESP if you are an ESP user and Prepar3D if you are a Prepar3D user.

Installation and registration is performed, in the first instance, by running the FSUIPC4 Install program you find in the main download ZIP file. There are instructions inside the ZIP for this, please follow those.

Once you have run the FSUIPC4 Installer once, if you subsequently obtain an updated version of just the FSUIPC4.DLL module from my Support Forum or another site, installation is easy: just copy the FSUIPC4.DLL file into your flight simulator Modules folder. Take care, though, that it IS a later version.

Next ... running FSX. But read this first:

You have now completed installation and can simply load up Flight Simulator and go fly. If you have not registered, the only user facilities you have in FSUIPC4 are those shown in the Add-Ons-FSUIPC dialogue, including message display options (previously handled by AdvDisplay) and Logging. If you do have a Registration, you should enter your registration details via the Installer, as already described. Do this before running FSX.

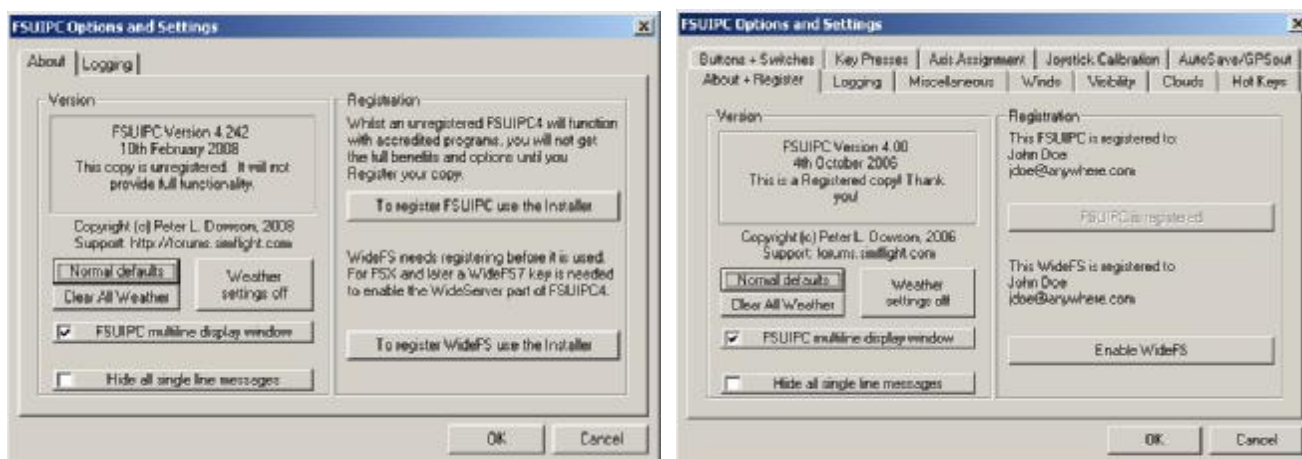
When you first run FSX after installing a new or updated add-on such as FSUIPC4 you will be asked if you really want to run it. You'll need to confirm this. Then FS itself will ask if you want to add it to its "Trusted" list. Confirm this too, otherwise it will ask you every time you re-run FS.

Okay, I've installed, and optionally registered. Now what?

With FSUIPC4 correctly installed, and Flight Simulator running *and ready to fly*, look at the FS Menu bar at the top of the screen. (Press ALT to bring it up if it is hidden). There should be an “Add-Ons” item, probably the very last word at the right-hand end of the menu. If it isn't there then either the version of FSUIPC4.DLL doesn't match the available versions of SimConnect (which should not happen if the Installer succeeded), or something has gone wrong with the placement or editing of the DLL.XML file.

If the Add-Ons menu is there, select it. You should then see “FSUIPC ...”. Again, if you don't, the install failed—but in this case it is likely to be only the DLL.XML file which is incorrectly edited or placed.

If you have the correct menu entry, select it and you will get the FSUIPC settings display shown here (the version number and date will be different). The left-hand picture shows an unregistered installation, whilst the right-hand picture shows a fully registered copy (but with the normally hidden Visibility options page still showing):



You will see that in the left-hand example the copy is described as “unregistered”, and the entire right-hand part is entirely concerned with telling you about Registrations. **You cannot register FSUIPC4 or WideFS7 whilst running FSX. You need to exit and re-run the FSUIPC4 Installer.**

IMPORTANT NOTE FOR VISTA and WINDOWS 7 USERS

If you have installed FSX in its default folder (or any folder within "Program Files" or "Program Files x86"), then Windows will be protecting the folders against normal user access. This applies even if you are the PC's administrator.

The best and cleanest way out of this would have been never to allow FS to install into Program Files in the first place. Instead some nice easy folder like C:\FSX would be better, much better. However, assuming it is too late now, what can you do?

First off, to be sure you can actually manipulate the real files in the FS folders, run Windows Explorer "as administrator". That means right clicking on it or its shortcut and selecting "run as administrator". That gives it elevated administrator privileges.

Second, you will find that a lot of add-ons for FS will have difficulties if they too need to access and/or write to FS's own folders. The authors or support forums for those will probably advise you to run those applications "as administrator" too, to get over this problem.

If you do this and those applications access FS via FSUIPC4, they may complain that they cannot connect to FSUIPC4, or they cannot find it. For two programs to communicate via shared memory under Vista or Windows 7 they *must* be running at the same privilege level! So, you will need to either run everything normally, or run both FS and the applications "as administrator". You can't mix.

The latest version of FSUIPC4 does include code to get around this problem, and that does appear to work—sometimes. It seems to vary depending on the version and update state of the user's Windows system.

De-Installation

If you ever want to remove FSUIPC4 from your FS installation, so that it cannot possibly have any further effect, just delete the FSUIPC4.DLL file from the Flight Simulator X Modules folder. You can delete the FSUIPC4.INI and FSUIPC4.KEY files as well, and any FSUIPC4 and WideServer logs you may find there, but with the DLL removed those other files will be doing nothing

Please note that without FSUIPC4 none of my other modules will operate either. These include PFCFSX.DLL, PFCHID.DLL and EPICINFO5.DLL and their INI, CFG or LOG files.

To simply compare things with and without FSUIPC4, move it to a safe place, run FSX, close FSX, then move it back. You only lose the ability to run it when it is in place if the installation file (DLL.XML) is changed or removed from its correct folder.

Finding and Editing files relating to FSUIPC and WideFS

Normally, when asked to check, post, edit or otherwise handle a file in a Windows folder, such as the Modules folder in FSX, you will use Windows Explorer to find it and select it. There are some things you need to know here, because Microsoft, in its wisdom, has decided that, with effect from Vista, it should hide some important parts of filename from you, by default.

I recommend you change this nasty habit. Open Explorer and find the Tools-Folder Options selection. Then select the View tab. Some way down the displayed list, find and uncheck "Hide extensions for known file types". After you do this, INI files will show as ".ini" and not just as "configuration settings", and LOG files will show as ".log" and not just as "text file".

All FSUIPC related files like .INI, .LOG, .KEY, .MCRO and .Lua are plain text files. When viewing them, editing them, printing them, use a basic text editor like Notepad, *not* WordPad or any other word processor.

<p>MOST OF THE REST OF THIS DOCUMENT IS VALID ONLY FOR REGISTERED COPIES OF FSUIPC4</p>
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<p>The only facilities available to unregistered users are the Message Windows Options (described soon) and the Logging and Monitoring facilities (described much later)</p>
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Setting FSUIPC options

Options for registered installations of FSUIPC4 are controlled by parameters in a file called FSUIPC4.INI. This is not supplied with FSUIPC4, but it is generated the first time you run FS with FSUIPC4 installed. It sits with FSUIPC4 in the FS Modules folder. Most of the options of general interest are accessible whilst running FS, via a Menu entry. This is by far the best and easiest way to access the more popular options. There are still some you can only access by editing the FSUIPC4.INI file, but most of these are not useful to most users and are only described in the Advanced User's Guide. The main exception is the facility for running additional programs automatically when running Flight Simulator.

With FSUIPC4.DLL correctly installed and registered, and Flight Simulator running and ready to fly, go to the FSUIPC4 options: press ALT to display the menu bar at the top of the screen, then either use the Mouse to select the Add-Ons menu entry, then FSUIPC, or simply press D then F.

Unless you are starting off with a copy of FSUIPC4.INI copied over from a previous version or installation (see below notes for power users upgrading from previous versions), press the **Normal defaults** button. This may not change anything, but it just makes sure that in the discussion below we are both talking about the same thing.

You don't need to understand all parts of the Options and Settings to use FSUIPC4. But if you want to get maximum benefit it would be worth making a little effort. You can experiment anyway without doing any real harm, and you can always press **Normal defaults** at any time, and start again.

Another button here, **Weather settings off**, is there mainly to help WidevieW users to set up their *client* PC (not the *server*) so that WidevieW can copy the weather over correctly without FSUIPC interfering. WidevieW is a system for multiple views of FS over a Network, and is made by Luciano Napolitano. [*Note that the new FSX-specific version of WidevieW may use SimConnect directly for its weather copying, In this case the FSUIPC4 settings will only interfere if you have the "Allow changes to FS own weather" option selected in one of the Weather tabs*].

The **Clear All Weather** button is just a convenience provided for those who use FSUIPC's weather control and find it awkward to clear weather in FS's own dialogues. As you'll see, there's also a way of assigning this to a "hot key" so you can do it without going into menus at all. Note that FS won't actually clear the weather until you return to normal flight mode—i.e. exit the dialogues. Also, in FSX the weather clearing can take a while—it isn't always immediate.

Before going on to look briefly at each page of Options provided by FSUIPC, a quick word about how to operate the window. The tabs at the top select between various "pages" of options. You can visit all these, make changes, as you like, but nothing is actually changed until you press the "OK" button. If you press the ESCape key or "Cancel", or close the window using the close button at top right, then *none* of the changes you have made on *any* page will be effective. Pressing the "OK" button confirms *all* the changes made in *all* pages. You can re-visit any and all before confirming them in this way.

POWER USERS note: if you have a lot of investment in your Buttons, Keys, Axes or Joystick Calibrations via FSUIPC version 3 then you will want to retain most, if not all, of that work. This is okay—those parameter sections are identical in FSUIPC4, though there are many additional FS controls in FSX and some may have different functions or be omitted. Just use an editor to copy just the [Buttons ...], [Keys ...], [Axes ...] and [JoystickCalibrations ...] sections over from your FSUIPC.INI file to your new FSUIPC4.INI file. After that, check they all work and possibly re-assign those which have changed.

Message Window Options

FSUIPC4 provides support for a message window in the style of the in-built FS ATC window. This will display only multi-line messages sent to FSUIPC4, such as (and particularly) the Radar Contact menu window.

Options concerning the FSUIPC4 message window appear on the About screen, which is available to all FSUIPC4 users. The feature may already automatically be enabled when FS is first loaded, but it can be turned on and off (to use only ShowText for example) in the front option screen. There are two other options there:

- One, which is removed if the multi-line FS window is enabled, and which when checked stops multi-line messages going to FS's default message window. Use this if you want to use ShowText to display the multi-line text, such as on another screen or even another PC via WideFS.
- The other option which can be used to suppress many of the single-line messages in FS's normal message window. This removes ATIS messages and multiplayer login/out notifications as well as single-line messages from external programs, provided those are instigated using FSUIPC facilities. FSUIPC cannot prevent messages displayed by programs using SimConnect directly.

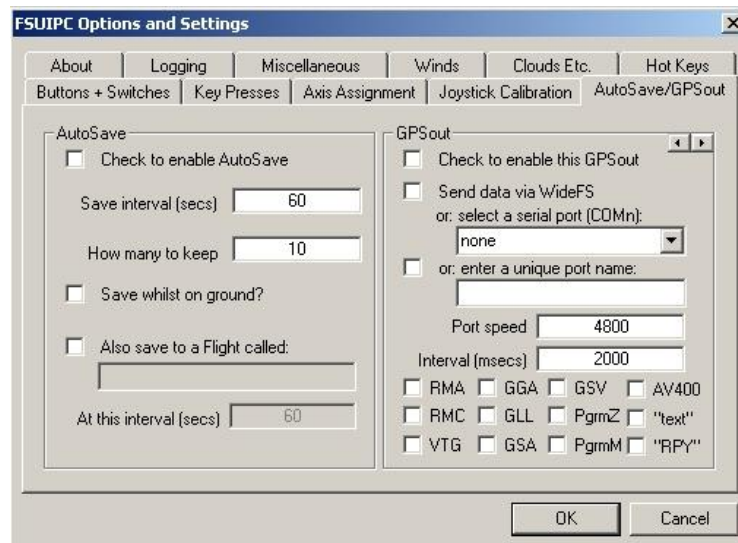
Note that the multiline FS window itself is part of FS: it can be moved and sized (unless locked in the Miscellaneous options), and undocked. Its position, size and docked state details are saved by FS (in its FLT files when they are saved). The details go into a section with the window name. The window only disappears when it is empty, but FSUIPC recognises the "AdvDisplay" hot key and will toggle the window on and off. This "AdvDisplay" toggle facility is now also available as an FSUIPC control, assignable in the Button options.

For unregistered users, the **AdvDisplayHotkey** parameter can be configured in the FSUIPC4.INI file (details are in the FSUIPC4 Advanced Users document).

The default message colour is Red, and it cannot currently be changed. Additionally you cannot change the Font size or style. The window is an in-built FS one, and I know of no way to edit any of them. For such options you may wish to investigate the freeware add-on program "ShowText", available in the **Download Links** subforum in my Support Forum.

AutoSave and GPSout

Both of these functions are now extras built solidly into FSUIPC4. Registered users can enable them and set their options in the Tab marked AutoSave/GPSout, illustrated here:



The two facilities, although sharing a Tab, are entirely independent of each other. Each is separately enabled, and all the options can be set and changed here. No INI or CFG file editing is needed. If you want to inspect the parameters they go into their own [AutoSave], [GPSout] and [GPSout2] sections in the FSUIPC4.INI file.

A brief description of each of these facilities follows:

AutoSave

AutoSave saves flights ("FLT", "WX" and "FSSAVE" files, plus optional "IPCBIN" files) at regular intervals, so you can retry that crashed landing or quickly recover from other problems.

By default, when enabled, AutoSave saves a flight every 60 seconds, and keeps the last 10 files. These files are placed in the standard user data folder selected by FSX. They are named **AutoSave day hhmmss**, where 'day' is day of the week. The time is the computer's local system time, NOT the one on the FS clock. This format allows you to easily select a suitable file to restart from. With 10 files at one minute intervals you have the last 10 minutes covered.

Note that AutoSave does not normally save these files whilst the aircraft is on the ground (EXCEPT maybe in slew mode if you started this mode in the air). This allows you to take a breather and recoup after a crash! <G>. If you really want it to save files when on the ground, you can check that option (see the picture above). They still only save when the aircraft is moving (or moved).

The files aren't saved whilst FS is paused, either, to avoid overwriting all those useful ones with identical copies of a paused simulator!

AutoSaved files are visible from the Missions Interface if you check the "Show saved missions" checkbox. This is nice to have, particularly if, as you try to work through missions, you run afoul of any serious problems and crash. These flights will automatically disappear from being listed under the applicable mission after being overwritten by newer AutoSave files that don't pertain to that mission.

You can also select an option to save an additional file set which has a fixed name and which is saved regardless of FS's mode or state. For this check the "Also save .." option and provide a name, such as "My Restart". The default interval is 60 seconds, but you can edit that too. The idea here is that you can set "My Restart" or whatever as your default flight, so after an program or hardware crash, or power outage, you can simply load up FS and continue from a few seconds before the problem.

If you want only this behaviour, and no timed files, disable the main AutoSave option but still enable the "Also save" one. Then only the "also file" will operate.

Note that if you decrease the number of files retained, you should also delete the excess files in the FSX files folder as they will then be left untouched by AutoSave.

Finally, note also that several add-ons, like the PMDG aircraft, save their own data in files in other places. Each time an autoSave occurs. These will accumulate and NOT be deleted by AutoSave unless you expressly request this to happen. For that you will need to edit the FSUIPC4.INI file. A special section on this is provided in the Advanced User's document. Please check its contents list.

GPSout

GPSout provides the facilities to make FSX look like a GPS device emitting positional and other interesting information to any program (or device) equipped to have a real GPS connected via the standard type of NMEA serial port connection. By this method you can have moving maps and other guidance software, normally running on a separate PC, following your flights in FSX.

You will need to connect your flying PC to your moving map PC with a serial "null modem" cable (i.e. send and receive crossed over), and configure your map program accordingly. Alternatively, if you use WideFS you can tell GPSout to send the GPS data to the Client PCs. You will need to configure those in the WideClient.ini files. A virtual serial port program (freeware) from MixW is available from my Support Forum. You can use this to generate a pair of linked virtual serial ports to connect between GPSout and a receiving program on the same PC, or between WideClient and the receiving program on a client PC. Either way, no cables are needed with this method.

[Note that the MixW virtual port program might not work on all systems. It does not work on Vista nor on 64-bit operating systems. An alternative is the one from Eterlogic. Their 32-bit version is free, and the 64-bit version is a reasonable \$US 25].

FSUIPC4 can simultaneously support *two* devices, on separate ports, or one WideFS connection and one local port. The second connection is setup in the same options screen: just use the little scroll-bar type arrows in the top right corner of the GPSout option page to scroll between the two outputs. All of the parameters can be different between the two except for the Interval. Whatever interval you set for one output will also apply to the other. This is because FSUIPC4 needs to keep the data synchronised.

GPSout *may* not support all other moving map and atlas programs, but it has been tested with:

- AutoRoute 2001: use GGA sentences
- AutoRoute Express 98: use GGA
- Anywhere Map, by Control Vision: use RMC, GGA and GSA
- MapPoint 2001: use GGA or RMC
- Map'n'Go: use RMC
- Jeppesen FliteMap: use RMC and PgrmZ with a Garmin NMEA setting,
or (for versions 8 & 9) RMC, GGA and GSA.

It is also known to work with real Garmin GPS units which support input in the "Series 400 Aviation" format (this may also be known as ARNAV, or KING format). For this you should set just AV400 as the only sentence, and the speed is normally 9600 in this format, but it may be adjustable.

I've received confirmation that the "Aviation In" mode works with the AV400 protocol, with the Garmin GPS III Pilot and the GPS x96 series aviation models. The GPS has to be in simulator mode, and then shows the correct track and vertical data as well as position and speed. One Garmin 496 user provided this information:

Garmin 496

First of all, you will have to buy the optional cable: Part Number: 010-10514-00 Description: "PC interface cable (RS232 serial port connector) for Garmin 496". The 496 comes with a USB cable, but I could not make it work. The GPSout settings are:

- Sentences=AV400
- Interval=1500
- Port=COMn (whatever COM port you connected it to)
- Speed=9600

In the Garmin go to 'Main menu' then 'Set up', and then to the 'Interface' tab. For 'Serial data format' select 'Aviation in'. Don't forget to put the GPS in 'Simulation mode' in the 'system mode' settings.

Use with PDAs may also be possible—in fact I've recently succeeded with this myself, using PocketFMS on an Ipaq Pocket PC.

For those who have an older Palm PDA, one with serial PC connection rather than the now ubiquitous USB, you can get software that will turn the PDA into a moving map device, working with GPSout, from www.gpspilot.com. Look for “Atlas” or “Fly” applications. For these you need to run the link at 4800 baud and sentences RMC and GGA should be specified for GPSout.

For the IPAQ, try “PocketFms” (pocketfms.com) like me, formerly a Donationware program but now apparently quite expensive. This is reported to run well in an Ipaq 3670 with the following settings:

Sentences: RMC, PgrmZ and GGA
Interval: 100
Speed: 52600

Though I use it on my Ipaq with

Sentences: RMC, GGA, GSA and VTG
Interval: 500
Speed: 38400

For PDAs on a USB connection I've received the following information which may help those with only USB connections on their Pocket PC:

- Check the unique port name option, and enter the name as \\.\WCEUSBSH001. If there are more than one serial-type USB devices, I think they are numbered 002, 003 etc.
- Kill ActiveSync on both the PC (Connection Settings: uncheck ‘Allow USB connections’), and on the PocketPC, if necessary, then fire up your PocketPC GPS software and select COM9/USB as your GPS receiver from within the PocketPC software. Hopefully everything should then be working together. In the case of PocketFMS on my Ipaq I just left it to find the COM port and speed automatically, and it did so without any problem.

This has been tried (with older versions of GPSout) on a Medion PDA (rebranded Mitac Mio 168) and an HP iPAQ without problems, and at baud rates up to 19200 using both the Medion Navigator (for cars) software and the PocketFMS software. Apparently both worked particularly well.

GPSout can also be used with some GPS emulator software—the Lowrance 500 and 1000 emulators from www.lowrance.com. The following settings are reported to be okay:

Sentences: RMA, RMC, GGA, GSA
Speed: 4800

though I think "RMA" should be left off as it is a total subset of RMC.

Another hint has been published for these emulators: you can set it up to accept NMEA in, but don't do this, This will probably work if you have a real Lowrance 500 or 1000, but just start the emulator and it should get a position.

Some notes on the NMEA sentences:

RMC: best for FliteMap, provides course and ground speed, but no altitude
RMA: similar
PgrmZ: Garmin NMEA 0183 extension for Altitude only: use with RMC
GLL: used by Microsoft Autoroute 2001 but GGA works better
VTG: usually used with GLL to provide course and ground speed data
GGA: also works with FliteMap and others, and provides altitude, but not course and speed
GSA: provides no useful information from GPSout, but appears to be needed by some applications (such as “Anywhere”) in order for it to be able to use the altitude in the GGA sentence.
GSV: similarly, nothing useful from GPSout but fixed satellite data for some programs which seem to need it.

On my part, GPSout has only been thoroughly tested with FliteMap, Memory Map and PocketFMS.

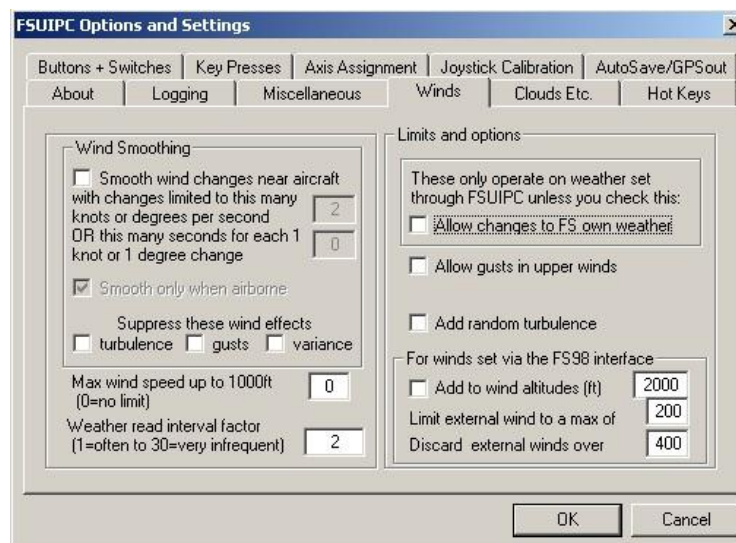
With version 7 of FliteMap, in the LORAN/GPS connection, select “NMEA 0183 RMC (9600)”, or find a Garmin NMEA setting. In versions 8 and 9 of FliteMap there are far more options, under “Connections–External Device Setup”. Those I now find work best are the Garmin NMEA settings. All the values are recognised if you send RMC and PGRMZ sentences, or RMC, GGA and GSA, and you can choose a really decent speed like 19200 or better, as well.

NOTE for Apple IOS devices

These devices (iPhone or iPad), when used with suitable connectors, can receive and understand some of the NMEA sentences produced by GPSout, but they need this parameter in the [GPSout] section of the FSUIPC4.INI file:

SimModelIndicator=Yes

Winds



The facilities on this tab are partly intended to work as filters on external weather being injected (through FSUIPC4) into FSX, and also, if the **Allow changes to FS own weather** option is set, on the weather set in FSX by its own system, whether by download or by direct injection via SimConnect separately from FSUIPC4.

However, the Wind smoothing options, and the surface wind speed limiter, work regardless of the **Allow changes ...** setting. They operate via a direct link into FSX's weather system, not via the METAR setting methods in SimConnect. When Wind Smoothing is enabled, FSUIPC4 also emulates turbulence, gusts and wind variance, as otherwise these FSX effects would be smoothed out as well.

Let's look at the options here at present, starting with the easier ones on the right-hand side:

- **Limit wind and discard ...:** These two limits on external winds are there to prevent odd things happening if a weather program operating across an Internet link gets corrupted data and attempts to set ridiculous wind speeds. This only applies to programs using the original FS98-compatible interface to FSUIPC4, *not* to programs like FSMeteo or ActiveSky, which, except where direct SimConnect versions are available (e.g. ASX), both use the New Weather Interface (NWI).
- The **Add to wind altitudes** option allows you to make FSUIPC4 add a specified number of feet to the altitudes of each wind layer specified by the external weather control program you are using, if any. This is only present to get around the problem apparent with some programs where, at high altitude airports, the surface wind is specified with an upper altitude at or below ground level! Again this is only used for winds provided via the FS98 interface.
- **Allow gusts in upper winds** does not make such gusts, but simply does not remove them. Normally FSUIPC4 stops gusts in all wind layers except the surface one, as upper wind gusts simply aren't realistic.
- **Add random turbulence** does just that. The turbulence may be added to any and all wind layers. See the next two options too.
- **Suppress turbulence** stops any wind turbulence being set at all. If wind smoothing is enabled FSUIPC4 will perform its own turbulence emulation, as otherwise the smoothing eliminates it all.
- **Suppress gusts** is there for folks who don't like any gusts. Use this when learning to fly! If wind smoothing is enabled FSUIPC4 will perform its own gust emulation, as otherwise the smoothing eliminates it all.
- **Suppress variance** stops wind direction variability, whether set by the weather reported with "V" or "VRBL" wind directions, or as one part of the turbulence emulation. If wind smoothing is enabled FSUIPC4 will perform its own variance emulation, as otherwise the smoothing eliminates it all.
- **Maximum surface wind speed** is self-explanatory. Useful when learning to fly, or if you think the flight modelling in the simulator is all wrong with cross wind approaches. The limit applies up to 1000 feet AGL. It works best with wind smoothing enabled, but even if it isn't it will endeavour to smooth the change above 1000 feet.

- The **wind smoothing** option does two things: prevent the wind changing except in small increments (and excepting any allowed gusts, turbulence and variance), and to correct the sudden wind reversals (or near reversals) which FS has long been prone to and which are still not fixed in FSX.

You can set the smoothing to allow so many knots and degrees of change per second, or, for really slow changes, you can specify the number of seconds it takes for even one knot or degree of change.

When smoothing is enabled FSUIPC4 will provide its own emulation of gusts, turbulence and wind variance (direction changes) when these are called for in the wind layer or cloud layer details. You can suppress these effects separately—cloud turbulence is suppressed by an option on the Clouds page.

An INI file option is available to make the smoothing action depend on the elapsed time in FS, instead of the real system time. This has the advantage that it stops whilst FS is in menus, or paused, and runs faster or slower according to the FS Simulation Rate. To use this way of smoothing, change this [General] parameter in the FSUIPC4.INI file:

SmoothBySimTime=Yes (defaults to No).

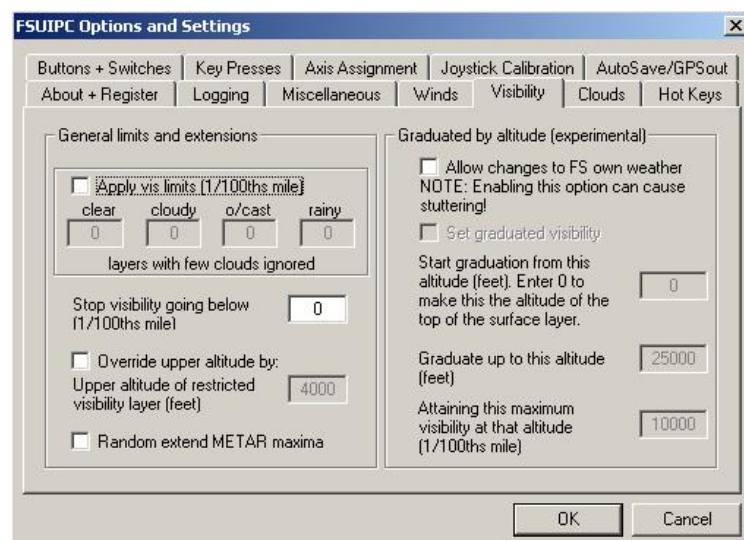
Note that the smoothing is still reset when you load a new flight, or move the aircraft location via the menu, or change the weather mode (theme / user / real, etc).

- The **Weather Interval Factor** controls the updating interval for the re-writes to FSX's own weather. The default of 2 produces a minimum of one second between updates excepting periods where the number of wind or Temperature layers build up too high and FSUIPC4's METAR-fixing mechanism operates to reduce them: then the frequency of updates it doubled, temporarily.

You should be able to leave the value defaulting at 2, but by all means try a higher value to reduce any performance impact should you notice any when you enable changes to FS's own weather. Alternatively, a setting of 1 may make the smoothing and other options rather more effective.

Do not set 0 here. That invokes a special test option which bypasses all the weather reading and writing facilities in FSUIPC4.

Visibility (*Optional*)



This option is not provided by default. In order to use it you will need to set 'VisibilityOptions=Yes' in the FSUIPC4.INI file before running FSX. The reason for it normally being hidden is that these options do not work reliably enough, and I don't want to appear to present them as a worthwhile part of FSUIPC4's User Options.

Anyway, if you do decide to enable this page, you can certainly experiment with the options here, but please do expect to be surprised or dismayed at present. They operate only by changing weather METARs at nearby weather stations, but the results at the aircraft are not always quite as one would expect. In fact they can be completely different.

The facilities are intended to work both as filters on external weather being injected (through FSUIPC4) into FSX, and also, if the **Allow changes to FS own weather** option is set, on the weather set in FSX whether by download or by other programs directly injecting weather via SimConnect..

The main options here of note are the ones to enable the visibility to be limited, and to provide a visibility that is graduated from a defined surface value up to a maximum at cruising altitudes. The latter cannot operate unless you allow changes to FS's own weather, and, because of the way SimConnect restricts how the weather can be set, the results may not be very satisfactory. This is why the facilities are labelled "experimental".

If enabled, by default the **graduated visibility** option starts at the top of the visibility layer and graduates the visibility value from there up to the upper altitude. This is done with a lower altitude for graduated visibility set to 0.

If you enable the **limits** (top left) then the four different maximum values (which are for the surface level visibility only) become active. One is for when it's raining or snowing, defaulting to 10 miles, two are for cloudy conditions, defaulting to 20 miles, and the other is for 'clear' conditions, defaulting to 60 miles (so effectively defeating the graduated visibility action). Please note that in this context 'clear' means no cloud layer with more than 2/8ths cover, so allowing for nice "wispy bits", and 'overcast' is assumed when there are 7/8ths cover in any layer. If it is cloudy or overcast *and* raining or snowing then the minimum of the two relevant values set for these conditions is applied.

If a non-zero **minimum visibility** is specified, this is applied after all the other values. It is applied to all weather, regardless of other options.

The **upper altitude of restricted visibility** can be set, allowing you to limit the thickness of the fog or mist layer so that when you climb out of it you get blue skies (or fancy clouds) above and around you, but still see the mist below.

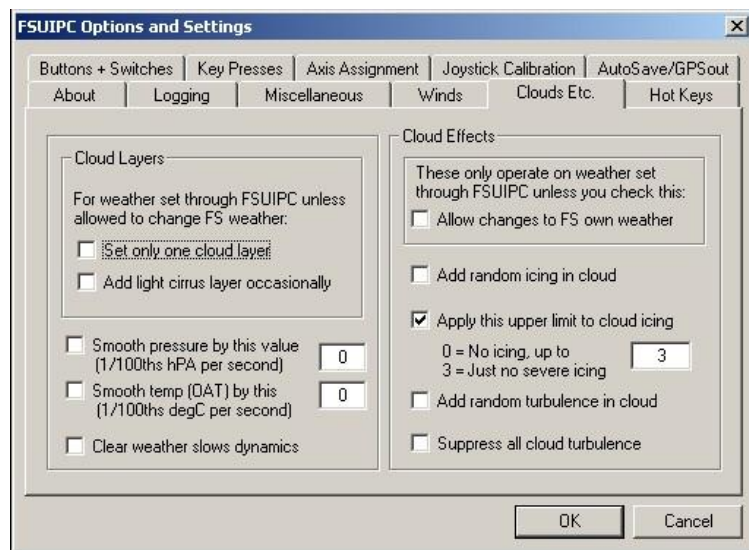
Random extend METAR maxima is provided to deal with the fact that most of the weather reports ("METARs") used by weather programs use a notation, when specifying visibility, which just gives "10SM" (10 Statute Miles") or "9999" (9,999 metres) for the visibility, whenever it is *at least* that good. The only exceptions, which are few and far between, are those weather stations that are actually attended and have the reports compiled manually rather than automatically.

With the option enabled, FSUIPC4 checks the visibility being set and adjusts it in three specific circumstances, as follows:

1. If the external program sets it to a value between 99.95 and 100.04 miles, it is reset to 6.20 miles. This is in order to rectify the results from any programs that take the 9999 metre maximum METAR visibility and transmit it literally as a number of 1/100ths of statute miles.
2. If the value is then in the range 6.15 to 6.24 miles (i.e. close to the 9999 metres maximum of a metric METAR), then on releases before FS2004 it is adjusted to a random value between 6.20 miles and the current maximum value. On FS2004, because the "grey sky threshold" is 10 miles, it is instead adjusted to a random value between 10.10 miles and the current maximum value.
3. If the value is between 9.95 and 10.05 miles (i.e. close to the 10 statute mile maximum of a U.S. METAR), then it is adjusted to a random value from 10 miles to the current maximum (10.1 miles minimum on FS2004).

Note that the random extension is computed only once every five minutes or so, to avoid constant changes in visibility should the weather control program re-write the value from time to time.

Clouds Etc.



This is the Clouds Etc. page with default settings. The “Etcetera” part refers to the options for QNH (pressure) and OAT (temperature) smoothing, and also the “clear weather slows dynamics” option. More on these below.

For Clouds, you can experiment with these options now if you like, and by all means report on the interesting things you find out, but please do expect to be surprised or dismayed at present. FSX has a mind of its own when creating its cloud effects.

The cloud facilities are intended to work both as filters on external weather being injected (through FSUIPC4) into FSX, and also, if the **Allow changes to FS own weather** option is set, on the weather set in FSX by means other than FSUIPC4. Note that enabling this option may reduce performance or induce some stuttering.

These facilities are provided:

Set only one cloud layer: this is a provision to try to improve performance by reducing the numbers of cloud layers. On previous versions of FS this was quite effective, but it seems the FSX clouds don’t have such a big impact, though this may depend on the other graphics settings.

Add light cirrus layer: to make the sky more attractive. each time there’s a change in the altitudes of clouds below, there’s a 20% chance that the cirrus layer will be omitted even if the option is enabled.

Limit icing levels: the number here is the maximum you wish to see—from 0 (no icing) to 4 (no limit: severe icing is accepted).

Random turbulence, Random icing: these, when generated, which will change over a period of time.

Conversely, you can elect to **suppress all cloud turbulence**.

The other, non-Cloud, options are:

- **Smooth pressure** attempts to prevent sudden atmospheric pressure changes by controlling the rate of change of both the sea level pressure (QNH) and the ambient pressure at the aircraft. You specify this rate in terms of the number of hundredths of an hPa (millibar) to allow per second. For example a value of 20 here will limit the change to 1 hPa every 5 seconds ($100/20 = 5$). See also the **Note** after the next paragraph.
- **Smooth temperature** attempts to prevent sudden air temperature changes by controlling the rate of change of the outside air temperature (OAT). You specify this rate in terms of the number of hundredths of a degree Celsius to allow per second. For example a value of 20 here will limit the change to 1 degree every 5 seconds ($100/20 = 5$).

Note that an INI file option is available to make all if the weather smoothing actions depend on the elapsed time in FS, instead of the real system time. This has the advantage that it stops whilst FS is in menus, or paused, and runs faster or slower according to the FS Simulation Rate. To use this way of smoothing, change this [General] parameter in the FSUIPC4.INI file:

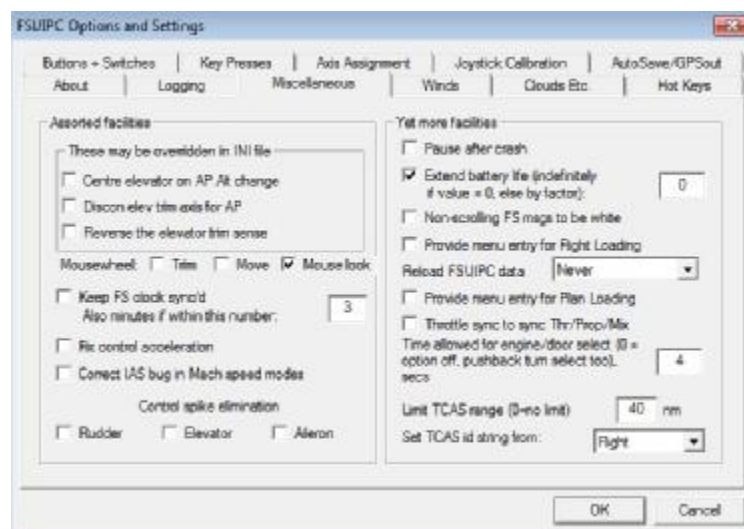
SmoothBySimTime=Yes (defaults to No).

Note that the smoothing is still reset when you load a new flight, or move the aircraft location via the menu, or change the weather mode (theme / user / real, etc).

- **Clear weather slows dynamics:** FSUIPC4 provides a “clear weather” hotkey facility, and a button on the About page, and also clears weather when requested by AWI (Advanced Weather Interface) weather programs, or automatically for external programs using the FS98-style weather interface. This action is normally needed before external programs try to impose any weather on FS, otherwise things get into a tangle and you don’t get the right results. However, in FSX there’s also a facility for having the weather dynamically changing (faster) of its own accord. This can be quite nice, but again it means you don’t get what you expect. This option, when enabled (as it is by default) makes the mentioned “clear weather” actions also reset the weather dynamics to “slowest change”. This is not a permanent change—next time you load up FS the slider will be back where you previously had it set.

Miscellaneous

This is called “Miscellaneous” because at present it contains several options that simply don’t really fit anywhere else.



Let’s look at the left hand column first:

- **Centre elevator on AP Alt change** makes FSUIPC4 centre (zero) the elevator input when the Autopilot ALT hold mode is enabled or disabled. This is mainly of use for keyboard flyers, where the original keyboard-set value for the elevator is retained, ineffectively, whilst the A/P controls the vertical modes, but which then undesirably re-asserts itself when the A/P control is relinquished. *See also the note in box below.*
- **Disconnect elevator trim axis for A/P:** This option is aimed at those who are using an analogue trim axis instead of the more usual trim up/down buttons, wheels or levers. When the FS autopilot has control vertically (such as in altitude hold or glideslope acquired modes), it disconnects the elevator axis so that joystick inputs don’t upset things, but doesn’t do the same with the trim axis. This FSUIPC4 option fixes that. If it is enabled it also disconnects the trim axis if an add-on or external autopilot disconnects the elevator axis via the special facilities in the FSUIPC4 interface (ref: offset 310A for programmers among you). *See also the note in box below.*
- **Reverse elevator trim sense:** This provides corrective action for some panels which try to control the aircraft pitch with the trim axis on a setup where this has been reversed. *See also the note in box below.*
- **Mousewheel trim:** This makes the mouse wheel act like a trim wheel, for fine changes to the aircraft’s elevator trim. Each wheel click equates to one trim increment or decrement, so fine control is made easy.
- **Mousewheel move:** This enables the movement of the eyepoint in virtual cockpit modes, using the mouse wheel. Forward and backward movement results from using the wheel normally, whilst for sideways movements you must use the

sideways action of the mouse wheel (on those modern mice so equipped). You probably also need Windows 7 (or later) for this to work, maybe Vista—but definitely not XP or earlier..

A single wheel click (i.e. the middle button) resets the eyepoint to its defined default position.

If both mousewheel **trim** (above) is also enabled, you can swap between trim (default) or eyepoint move by double-clicking the middle button (i.e. the wheel) *unless* the middle button use for Mouse Look has been disabled in the INI file..

Note that if **mouse look** (below) is also enabled and operative, the wheel reverts to a zoom control during its operation.

- **Mouse look:** This operates in a similar way to the default FSX facility, but without needing Controllers enabled in FSX—be sure not to have it enabled if you *do* have controllers enabled in FSX as the two facilities will clash.

As with the FSX facility, the mouse look option is turned on and off with the "**MOUSE LOOK TOGGLE**" control, which acts as a Toggle with parameter 0, or as an "ON" with parameter 1 and "OFF" with parameter 2. The latter two are assigned by default in FSX, to the space bar.

Note there's one main difference from the FSX facility: when first engaged the view is reset to centre-forward. this is the "origin" (0,0) of the view coordinates and allows the proper axis controls to be used without knowing where the current view is pointing. Also, there is no "dead zone"—moving the mouse moves the view.

To avoid this difference you can use the built-in FSUIPC controls instead of the FSX control. There are three: **mouselook on**, **mouselook off**, and **mouselook toggle**. If you want to still use the space bar, assign it in FSUIPC to **mouselook on** for 'press', and **mouselook off** for 'release' (*without* repeats). This will override the FS assignment. However, you can also use the middle mouse button* which is predefined as "mouse look on" for press and "mouse look off" for release. Note that this use does not interfere with the **mouse move** option, if that is also enabled. The mouse move option needs fast single (or double) clicks of the middle button, whilst the mouse look requires you to hold down the button whilst moving the mouse for the view changes.

Mouse zoom using the mouse wheel is also implemented and enabled by this checkmark.

* The use of the middle mouse button can be inhibited by a parameter (**UseMidMouseButton=No**) in the INI file, which you can set if you need the middle button for aircraft-specific facilities.

- **Keep FS clock synchronised:** This facility compensates for the phenomenon of FSX losing time. It just synchronises the seconds values (and optionally the minutes) with that of your PC's system clock. Provided you always keep to the normal 1x simulation speed this should stop FS time running slower and slower compared to real time (or, rather, PC time, which may not be quite the same as real time either). At other than 1x simulation speeds the facility is temporarily disabled to avoid odd things happening on the FS clock.

The time is only adjusted on the minute (i.e. seconds = 0), because FSX only provides a seconds zeroing facility. Further, it won't attempt to do this if the time difference is greater than the value shown (default 5 minutes). If you set that value to 59 minutes or more you effectively synchronise both minutes and seconds. **BUT** please note, any time adjustment of more than a minute or so will cause FSX to reload textures and you will get the occasional progress bar. This often happens, for example, after exiting from the menu system, whilst FSX's clock has not been updating.

NOTE: Aircraft-specific Overrides

The settings of the three options described above can be overridden for specific aircraft. This does require editing in the FSUIPC.INI file, and it depends upon you having already performed some aircraft-specific Joystick Calibrations for the relevant aircraft.

This is done by including the appropriate parameter(s), with Yes or No settings, as desired, in the aircraft-specific [JoystickCalibration.<...>] section of the INI file. Such entries will override the Miscellaneous settings for the specific aircraft only. The parameters relating to the four options are as follows:

DisconnTrimForAP	for 'Disconnect elevator trim axis for A/P'
ZeroElevForAPAlt	for 'Centre elevator on A/P alt change'
ReverseElevatorTrim	for 'Reverse elevator trim sense'

Note that you can edit these into the INI file whilst FS is running. Changes can then either be loaded by going to the Joystick options and explicitly reloading them, or simply by changing aircraft.

- **Fix control acceleration** is provided to try to fix the occasional stuck control acceleration—i.e. the problem with some panels where the increments/decrements to values like heading, course, and so on, get stuck at 10 (for instance—sometimes, for timing reasons, you get rather more unpredictability). These “accelerations” are actually legitimate when a key or mouse is held down long enough, but it seems some things can make them ‘stick’. What happens is that inside FS there's a timing check: closely arriving controls trigger the acceleration. The problem appears to be that FS does not care

whether these controls are all the same or all different. The assumption seems to be that, if they are arriving that close then they **MUST** be the same—the user couldn't move the mouse to another spot, or select another key on the keyboard, so quickly. However, some gauges or other driver programs can be sending controls very fast indeed, hence the problem.

The “fix” for this intercepts all controls, and changes the elapsed time check in FS before forwarding every different control, so that the time elapsed looks large enough. If it sees successive identical controls then it leaves them, so they can be accelerated as normal.

The end effect of this is likely to be the reverse of the original problem. For normal use of mouse and keyboard there is normally no difference, but if some gauge or driver starts sending controls very fast (i.e. at less than 400 mSec intervals) then the controls may not accelerate even when you expect them to. I tend to think this is better though.

Note that this fix is defaulted off. This is because, for those exact same panels it is designed to help, the continuous arrival of those controls causes keyboard use to never accelerate. Numeric keypad users for throttle, elevator, rudder, aileron and trim, in particular, may find these controls very unresponsive as a result. If you use a joystick then I recommend enabling this facility, but otherwise make sure it is off.

- **Correct IAS bug in Mach speed mode:** This fixes an error in A/T Mach mode whereby the Autopilot IAS register is not maintained as the equivalent, at the current altitude, of the currently set Mach value, so causing a sudden speed change when external autopilot control programs automatically change back to IAS mode on descent.
- **Control Spike Elimination** provides controls to ignore signals specifying maximum possible deflection on rudder, aileron or elevator. These were mainly useful in conjunction with Wilco's 767PIC on FS2002, which seemed to cause spurious rudder ‘spikes’ when flown with the yaw damper switched off, and also occasional spikes on the elevator (especially with the 1.3 version update). Whether they have any real application with FSX remains to be seen (please tell me).

Please note that if you fly with any of these options set you should also consider calibrating your controls in FSUIPC (see the Joysticks section, later), setting a “dead zone” at either extremes of the travel. If you don't do this you may find it impossible to obtain maximum deflection. Calibrate first, with the “spike removal” option off, then test it with the option back on.

Facilities listed in the right-hand column are::

- **Pause after crash:** This option merely makes FSX enter ‘paused’ mode when it has reloaded a flight after a crash. I found this very useful in some situations where the reloaded flight places the aircraft part way into an airport building instead of correctly on the ramp. I think this also happens with some of the “Go To Airport” parking selections. At least with it paused you are able to select slew, unpause, and move the aircraft to a safe location.
- **Extend battery life** keeps the voltage on the battery above failure point for longer. The battery discharge can be prevented from reducing the voltage too low for a specified multiple of the normal FS run-down time. The default is ‘0’—the battery voltage will be kept up indefinitely. The factor can be 1–999. For example, if the battery normally fails after 90 seconds, then a factor of 40 will keep it going for one hour. A factor of 1 is the same as disabling the facility.

Note that once the battery has discharged FS records an electrical failure in any case. FSUIPC4 cannot re-charge a battery once the voltage has been allowed to drop. FSX may not let you clear the electrical fault in its menu—you must recover power by either reloading the aircraft or, better, getting an engine started to re-charge the battery.

- **Non-scrolling FS messages to be white:** This option merely allows application messages displayed in FS's own message bar (normally near the top of the outside view) to be coloured white on green, rather than the usual red on green. [Note that this only works after you have installed the SP1 update for FSX].
- **Provide menu entry for flight loading:** in its own Menu system FSX unfortunately only allows loading of Flights from the default location (“My Documents\Flight simulator X Files”). This FSUIPC4 option allows loading of Flights from anywhere within reach of a standard Explorer file selection dialogue. When checked you will find an extra entry in the Add-Ons menu.
- **Reload FSUIPC data:** This operates an option to save application program settings from FSUIPC data “offsets”, with saved FSX Flights, and optionally reload them when flights are reloaded. This can enable many FSUIPC client programs to continue running when reloading and recovering from an aircraft crash or even from an FSX crash or hang. It can especially apply to WideFS client applications on networked PCs, if they are left running whilst FS is reloaded.

There are four variations, selectable in the little drop-down list:

Never: the FSUIPC data is not saved nor reloaded. This is the default, so there's no change for those not interested.

Menu: FSUIPC data is always saved with a flight (an “ipcbin” file is created), but it isn't loaded unless the flight is loaded using the FSUIPC-Added menu item “Load Flight+Data”.

Auto: FSUIPC data is always saved with a flight (an “ipcbin” file is created), and it is automatically loaded if the flight being loaded is an AutoSaved one (or “AlsoSaved”). Any flight with data can also still be loaded using the FSUIPC-Added menu item “Load Flight+Data”.

Always: FSUIPC data is always saved with a flight (an “ipcbin” file is created), and it is always re-loaded when the flight is loaded. Generally this is not recommended, as some of the program data may refer to programs not currently running. No special menu entry is created for this option as it isn’t needed.

Note that all of the FSUIPC offsets are saved, in a binary file exactly 65536 bytes in size (the size of the offsets data memory exactly). However, only those pertaining to application options and settings are reloaded—the rest are re-supplied by SimConnect, and so on, after the flight is fully loaded. The rest of the data may well be useful for diagnostics, however.

- **Provide menu entry for plan loading:** in its own Menu system FSX unfortunately only allows loading of Plans from the default location (“My Documents\Flight simulator X Files”). This FSUIPC4 option allows loading of Plans from anywhere within reach of a standard Explorer file selection dialogue. When checked you will find an extra entry in the Add-Ons menu.
- **Throttle sync to sync Thr/Prop/Mix:** When selected, this makes the Throttle Sync Hot Key (see the Hot Keys section) and the added Throttle Sync controls synchronise the Prop pitch and Mixture settings to the Engine 1 values, as well as the throttles.
- **Time allowed for Engine/Door select:** This controls the FSUIPC4 facility to allow the Engine and Door selection keys (SELECT 1–4) to be separated from the original control by any other non-select using FS controls. In other words, after E for Engine or Shift E for Exit/Door, the pressing of 1, 2, 3, and/or 4.

Primarily this is of use with advanced aircraft panels which send controls regularly, internally, thus disrupting such selections. The option can be disabled by setting the time allowed to 0. Otherwise the value is the number of seconds allowed for the one or more selections.

Also, with this facility enabled (i.e. any non-zero value) FSUIPC4 provides FS pushback direction from the SELECT 1 and 2 controls (again, normally the main keyboard keys 1 and 2), no matter how long since the pushback was started, provided it is still going on. This improvement allows you to, for instance, look out of the side windows or start engines during initial pushback without thereby losing the ability to select the turn direction with the SELECT (1 or 2) keys or controls.

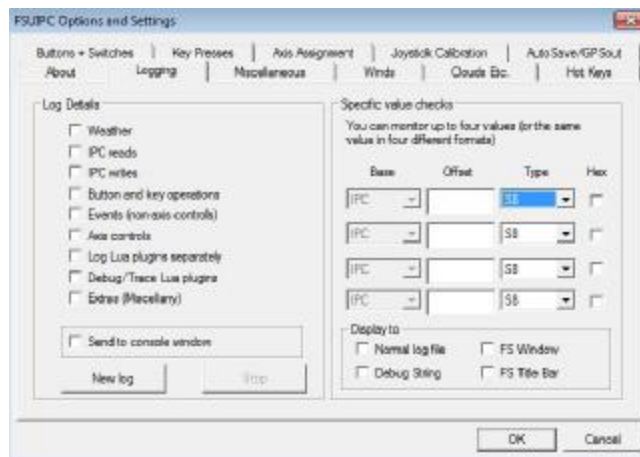
- **Limit TCAS range** is for FS2002/4 and applies to *airborne* AI traffic. If this is set to 0 no limit is applied, but there is then a danger that busy areas will have more aircraft than can be accommodated in FSUIPC’s tables (currently these can cope with 96). The default is 40 nm, which should be ample. There is little point in setting it much greater than 80nm as that seems to be the range in which FS generates flights in any case. When the tables are full, those aircraft which are furthest away won’t be listed, so nearby TCAS warnings should still be good. Ground traffic, which has its own table (also currently up to 96 aircraft) are subject to a built-in range, fixed at 3 nm when your own aircraft is on the ground, or 6 nm when you are airborne.
- **Set TCAS id string from ...** allows you to determine how FSUIPC provides A.I. aircraft identification to any program using the TCAS data. Probably not many strict TCAS displays show aircraft ID or type, but the information is available. You can choose from the following ways of distinguishing the aircraft:

Flight	for airline plus flight number, or tail number, as available (this is the default and recommended)
Tail	for tail numbers only
Type	for the ATC aircraft type, generally only the Make, at least for default aircraft
Title	from the aircraft title (in the .CFG file), truncated to 17 characters
Type+	for the type as above, truncated if necessary, plus the last 3 characters of the tail number
Model	for the aircraft model

Note that all the TCAS options here can be locked, so they cannot be changed by you or by programs except by editing the INI file. To do this, add the line **FixedTCASOptions=Yes** to the [General] section of the FSUIPC4.INI file.

The utility “TrafficLook”, as supplied with previous versions, can be used with FSUIPC4—you can see the difference in these latter selections in its display. In the File menu of Trafficlook you can select Airborne or Ground traffic. If you want to see both, run two copies. If you are new to FSUIPC, get TrafficLook and other extras from my Support Forum (link in the subtitles to this Guide).

Logging



FSUIPC4 contains considerable weather and application program debugging aids, through its logging facilities. You shouldn't need to use these unless you run into problems with an application and want to help the author sort it out. The files produced by the logging facility may be interesting to you—try enabling the **Weather** logging and looking for FSUIPC4.LOG (or FSUIPC4.n.LOG files where 'n' is a sequence number) in the Modules folder. They are simple text files, and when weather logging is operating they will contain a complete history of the weather changes which occur.

Perhaps of possible interest to many users are the facilities to log **Events** (all FS controls other than those from Axes), and, separately, Axis control inputs. In particular you may be interested to see the results of pressing buttons or keys, to see how FS is interpreting these actions. Also, many of the more complex Panels do send a lot of controls very frequently, for reasons which, when you look at what is sent, seem pretty obscure. It is interesting to see such ways of utilising the excess power of your PC.

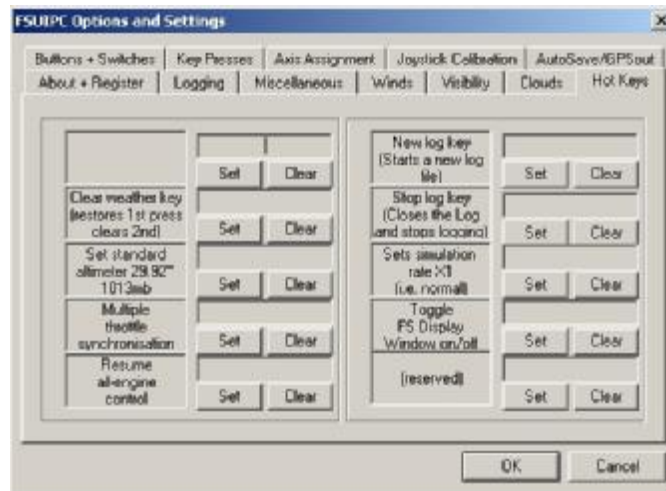
The **button and key operations** logging will be primarily of use to those of you who make good use of the comprehensive key and (especially) button programming facilities available in FSUIPC4, especially when editing the FSUIPC4.INI file for more powerful and conditional options. The logging will help you understand exactly what is going on.

The **Lua program logging** option not only enables extra messages to be logged for Lua plug-in operations, but also causes each Lua plug-in to produce its own separate Log file when it is run. These are cumulative (each time the same plug-in is run it adds new entries to any existing log file it has), so you don't get a huge proliferation. *More information about Lua plug-ins is provided in separate documents you will find installed in your FSX Modules folder.*

The **Send to console window** option allows you to see what is being written to the log in real time—provided you run FSX in Windowed mode. The log is updated in a “console window”, which you can size to suit your needs. **WARNING: Do not attempt to close the console window directly, as this will close FSX too!** To remove it, just go back to the Log options and uncheck it.

As you can see from the illustration above, on the right-hand side there are also some technical developer-oriented facilities provided in this page. They are described in the Advanced User's document, but you should note that this is really intended only for programmers and other users of the FSUIPC4 SDK except under direction of Support staff.

Hot Keys



At present several functions in FSUIPC4 can be controlled by assigned keypresses. These are:

- **Clear weather:** a single hot key combination with a dual function. The first time this is used it *restores* the last set external weather, if any. The second time, with no intervening changes, it clears the weather entirely, setting the FS default clear weather. The recommended Hot Key setting is **Ctrl+Shift+W**. This action also resets the dynamics to “slow change” *unless* this option has been disabled in the **Miscellaneous** page.
- **Set standard Barometer** on the altimeter. This is used to set the altimeter to 29.92” (1013.2mb) for flying flight levels.
- **Throttle Sync:** This operates a facility to make all throttle inputs, for any engine, affect the throttle inputs to all engines. It’s a toggle function—if it is on then using it again turns it off. For best use of this facility you will want to also calibrate the separate throttles in FSUIPC4’s **Joysticks** pages.

If you are only using a single throttle then this won’t make a lot of difference except that *every* time you use it FSUIPC will make the throttle selection (i.e. the keypress E+1 ... etc) apply to all engines. However, it works a lot better even then if you’ve calibrated the throttle axis in FSUIPC4’s **Joysticks** pages.

If you also select the option to synchronise propeller pitch and mixture settings (see the **Miscellaneous** page), then the same Hot Key operates all three together. There again, if you are using joystick axes for propeller pitch and/or mixture you should calibrate them in FSUIPC4’s **Joysticks** pages.

If an assigned reverser axis is used whilst throttle sync is engaged, the sync action will be automatically cancelled.

Note that this same facility can now be assigned to keypress or buttons/switches via the additional Throttle Sync controls in the drop-down assignments lists. As well as Toggle actions you can program On and Off actions separately.

- **Resume all-engine control:** This merely does the same as the keyboard sequence E 1 2 3 4 (or less for fewer engines)
- **New log:** starts a new log file (see Logging, above). The current (latest) log file is always called “FSUIPC4.LOG”, previous ones being renamed “FSUIPC4.n.LOG” where ‘n’ is a sequence number.
- **Stop log:** does as it says, stops logging, closing the current log file and starting a new one with only default logging, no detail. The file just closed will have the latest serial number, filename format FSUIPC4.n.LOG.
- **Set simulation rate back to normal (x1):** This is really only useful to those who fly at fast simulation rates like x16 and want to get back to normal in one keypress to avoid some of FS’s texture reloads.
- **Toggle FS Display Window On/Off:** Operates in conjunction with the FS display facility (e.g. for Radar Contact menus) which was described near the beginning of this Guide.

Note that these Hot Keys can be assigned to joystick buttons, by programming the button to produce your assigned keypress combination, This is described in the next section.

User profiles for all control settings

Much of the usefulness of FSUIPC these days springs from its very flexible and powerful provisions for assigning and programming control inputs for your aircraft. There are sections (each with its own Chapters in this document) for assigning Key Presses, Buttons and Switches, and Joystick Axes, and for calibrating and copying the latter for a variety of purposes.

Part of the power of this comes from the facilities to make such settings specific to an aircraft, or selection of several aircraft. Controls for helicopters are obviously rather different from those for light prop aircraft and those again are different from jets. Even within those categories there can be strong differences, such as between the calibration needs for fast jet fighters and the more lumbering heavy airliners. And, of course, even within the airliner “group” between the users of joysticks (e.g. Airbus) and yokes (e.g. Boeing).

For a long time now FSUIPC has been able to allow different assignments and calibrations to different aircraft, with automatic switching as aircraft are loaded, by using the specific *name* or ‘title’ of the aircraft and having separate sections in the parameter file (the INI file) for each. There is a facility for using shortened names or parts of names (sub-strings), long explained in the Advanced User’s Guide with user’s examples appended. But it is probably not as satisfactory as it should be.

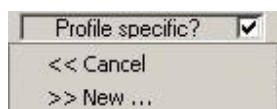
This has been changed. “Profiles” are a better way, and using profiles rather than “aircraft-specific” facilities is now default behaviour. A “profile” is a user-named set of parameters, applying to Key Presses (“Keys”), Buttons and Switches (“Buttons”), Axis Assignments (“Axes”) and Calibrations (“JoystickCalibration”). Think of the profile name as a generic term for the type of aircraft you want to use those settings with.

So, for example, you could have Profiles called “Prop”, “Jet”, “Helo” with appropriate assignments in each, and then for each aircraft you simply select which profile you wish to use for it.

For users *not* previously using Aircraft Specific settings

In the FSUIPC options, in all the places where previously you saw an “aircraft specific” checkbox, you will now, instead, see a “profile specific” checkbox. There will be no other outward difference, until you actually use one of those to select a Profile for the currently loaded aircraft.

When you do you will see something like this:



You can then select **Cancel**, to change your mind, or **New** to create a new Profile. If there are already existing profiles you can also select option **"New, based on ..."**, which will lead to another selection where the Profile to be copied can be selected. Both **"New"** and **"New, based on"** will then require you to give it a name, so this pops up:



Think of a suitable name for your profile, type it in and press OK. The name will appear in the title bar, and the currently loaded aircraft will be its first user. Now any assignments you make, here or in any of the Tabs, with the “profile specific” option checked, will be associated with this profile. The name of the active profile will always be shown in the title bar of the options dialogue in these tabs.

Next time you load a new aircraft and elect to use Profile specific options for it, the Profiles you’ve already created will be available to you to select from, or, again, you can create another. If you use a profile which has already been created, any profile-specific settings will become available to this newly loaded aircraft straight away. FSUIPC4 will have to load them, and it will tell you it is doing so.

Changing or removing Profile assignments

If you ever want to change the profile assigned to an aircraft, or remove it from such as assignment, it will be necessary to do this outside of FS, by editing the FSUIPC configuration settings file (FSUIPC4.INI). Use a text file editor such as Notepad (*not* a word processor). You will see that the file is divided into many sections with headings in square brackets, [...]. find the one with the Profile name, as follows:

```
[Profile.<name>]
```

where <name> is the name of the profile. Within that section you will see a list of aircraft names which are associated with that profile. just delete the line containing the aircraft name you wish to withdraw.

Then, on the next FS session you will find you can reassign that aircraft or create a new profile for it.

For users already having Aircraft Specific settings

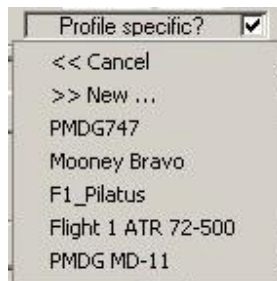
If you are an existing user of aircraft-specific settings and you want to change over, it is going to be a lot easier simply to delete your settings file and let FSUIPC make a new one. However, if you have a lot of work invested in those settings, then a conversion can still be done. I'll try to explain how.

Because this is a different mode for FSUIPC to operate within, you cannot change to using Profiles whilst FS is running. Before loading FS, find your FSUIPC4.INI file (it will be in your FSX Modules folder, possibly labelled by Windows as configuration settings file). Load it into a text editor, such as Notepad. The file will contain a number of named sections—each headed in the form [name]. The first is probably [General], and that is the section we want. There are lots of parameters there. Look for one reading **UseProfiles=No**.

If you find it, change the 'No' to a 'Yes'. If it isn't there, add the line **UseProfiles=Yes**.

You cannot mix the aircraft-specific method and the new Profiles method. So, when you choose to use profiles, FSUIPC converts all of your Aircraft-Specific sections to Profile sections, and actually automatically creates Profiles for every different aircraft name you've used. It retains the aircraft names, but these become Profile names instead ... how else can it name them, after all?

Here's an example of the Profile selection menu you might get with several assorted aircraft already with specific settings:



[Note that the "ShortAircraftNameOK" facilities (described in the Advanced Users Guide) have been used, and can still be used, with Profiles, though their necessity is much reduced.]

Now, this will work, but you probably don't want this. You have two choices. You can either delete all of your aircraft-specific settings in your FSUIPC4.INI file, before loading FS, and thereby start again (in which case, see the previous section), or you can edit the INI file to rename the profiles, and possibly merge or delete some of them. So, assuming you want to do this, close FS and load up the FSUIPC4.INI file into Notepad or some other suitable text editor.

You will see that your aircraft specific controls settings are still there, untouched, in your previous sections, i.e.

```
[Buttons.<,aircraft name>]
[Keys.<,aircraft name>]
[Axes.<,aircraft name>]
[JoystickCalibration.<,aircraft name>]
```

But there are now new Profile sections, for every aircraft for which you have such specific settings. For example, in the case shown in the picture above there were these Profile sections created:

```
[Profile.PMDG747]
1=PMDG747
[Profile.Mooney Bravo]
1=Mooney Bravo
[Profile.F1_Pilatus]
```



```
1=F1_Pilatus
[Profile.Flight 1 ATR 72-500]
1=Flight 1 ATR 72-500
[Profile.PMDG MD-11]
1=PMDG MD-11
```

These Profile sections are where FSUIPC will keep its lists of all of the aircraft using that profile. Since it automatically generated these, they all contain the one aircraft it knows, for each “profile”. Your first job is probably to change the names – that is replace the aircraft names in the [...] section headings, to your own choice. You may or may not want to merge or delete some at the same time. If you do, remember to add the aircraft name itself to the required Profile section. The lists there should be consecutively numbered from 1. Any missing number will end the list.

Finally, the order in which the Profiles are listed in the menu is determined by the order of the Profile sections in the INI file, so order them how you like.

Keeping track of multiple control devices ("Joy Letters")

Buttons, switches and axis assignments in FSUIPC4 all depend upon the software identifying your devices correctly and consistently each time you run FS. When you have multiple devices – perhaps a yoke or joystick, a throttle quadrant, rudders, and perhaps others, each of these appears in Windows as a different device. In FS’s own assignments you will see the name of the devices in its drop-down—though even with that mechanism, if you have two devices with the same name (e.g. two throttle quadrants), then it is not always easy to know which is which until you try them.

FSUIPC4 uses joystick *numbers* to identify connected devices. This is because it primarily uses the simpler (and faster) low-level Windows joystick facilities rather than DirectInput (though that *is* now used for axes), and that interface supports up to 16 devices numbered 0 to 15.

But, there is a problem with using the numbers. If you unplug a device and plug it in via a different socket, or even just update or change Windows versions, the numbers assigned can, and often do, change! This will render most or all of your carefully set assignments, as recorded in the FSUIPC4.INI file, incorrect. Things will become chaotic or maybe not work at all!

So, to counter this, FSUIPC4 now provides help. It doesn’t solve the problem completely, but it goes a very long way.

When first loaded, and each time the FSUIPC Options dialogue is used, FSUIPC4 scans the Windows registry and makes a list of the names and "GUIDs" lodged there for each of those connected joysticks which it refers to numerically. These are listed against their number in an INI file section called [JoyNames]. Here’s an example:

```
[JoyNames]
AutoAssignLetters=No
0=4 axis 13 button gamepad with hat switch
0.GUID={76A711C0-9D3D-11DE-8001-444553540000}
1=Microsoft SideWinder Freestyle Pro (USB)
1.GUID={DEAE5BF0-C229-11DE-8001-444553540000}
```

These just happened to be the two joysticks I had connected at the time. Don't worry about what those strange GUIDs mean, just take it that they help identify the devices uniquely—useful if you have some with the same name!

This, even by itself, is useful for users with several such devices and which may sometimes be re-connected differently, so possibly getting IDs re-allocated. However, it doesn't avoid the consequent need to edit every [Button] and [Axes] section to reflect the new IDs. So ...

You, the user, can assign an **alphabetic** ID (A–Z, caps only preferred, please). There are two ways of doing this: you can assign an alpha ID to a name (it must match one of the listed names identically), or you can assign it to a specific numeric ID. The former method is generally preferable as then the re-assignment will be automatic if things move. And if you use the former method then it is best to also assign the GUIDs. In fact this is essential if there are devices with the same name.

In general you would choose letters suggesting the type of control—J for Joystick, Y for Yoke, T for throttle or Q for Quadrant, G for G-stick, etc. If the letters assigned do not matter you can change the “AutoAssignLetters” option, in the [JoyNames] section, thus:

```
AutoAssignLetters=Yes
```

With the option so set, FSUIPC4 will automatically assign the alpha IDs, starting with A and proceeding to Z, skipping I and O. In the above example this would result in:

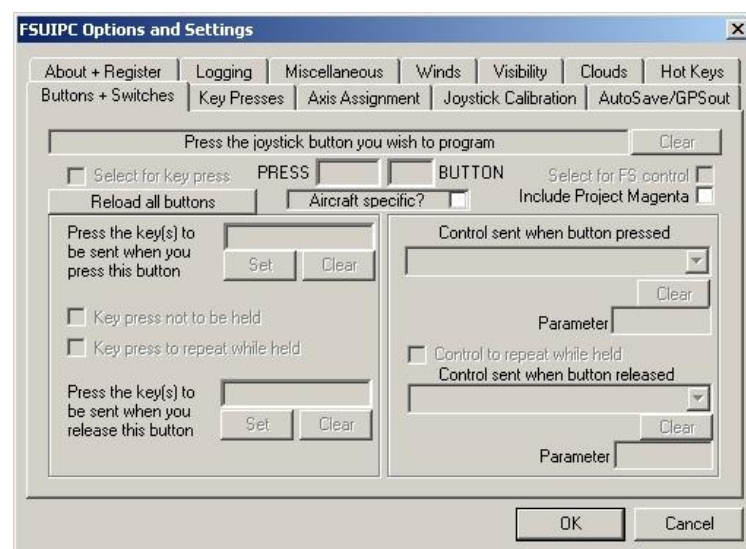
```
A=4 axis 13 button gamepad with hat switch
A.GUID={76A711C0-9D3D-11DE-8001-444553540000}
B=Microsoft SideWinder Freestyle Pro (USB)
B.GUID={DEAE5BF0-C229-11DE-8001-444553540000}
```

Okay. That takes care of pretty much all of the possible confusions, except for one thing: devices listed with assignments subsequently removed altogether. This is handled by FSUIPC up to a point. If you have assignments to an alpha ID and that joystick is removed, so no longer being named, the assignments remain included in the INI file but are not loaded into FSUIPC. The JoyNames list will show the letter as an error. For example:

```
C=<!!! MISSING JOYSTICK !!!>
```

It cannot show the missing name as it cannot read the name for a disconnected device, but it does indicate to you that those assignments, the ones in this example to C's buttons and axes, will not operate until the device is reconnected ... and then, of course, it may not be the same one. If you re-connect whilst FS is running it may not be seen in any case, but try going to the axes and buttons Tabs in FSUIPC4 options and using the "reload" button. You may get everything back as before!

Buttons



This page provides facilities for programming joystick buttons. Whilst this is particularly suited to EPIC, GoFlight, VRInsight and PFC users, it is by no means specific, and so can be useful for any joystick system with 'spare' buttons. The only proviso is that, except for the special support for EPIC, GoFlight, VRInsight and PFC, these are visible through the Windows joystick interface (the Game Controllers applet in the Control Panel), using the standard Windows facilities. *FSUIPC4 does not use DirectX for button scanning, so it may not see newer 64-button ranges.* Notes on specific types of "button" connections are provided below.

Note that the supported serial port VRInsight devices need special configuring in the FSUIPC4.INI file before you can assign Buttons and Switches in FSUIPC4. This is not hard and step by step instructions are provided for this, but this is outside the scope of this general User Guide, so please refer to the Advance User's guide where you will find VRInsight mentioned in the Contents list.

Additionally, the Saitek Pro-Flight Radio, Multi- and Switch panels can now be programmed via FSUIPC's "virtual buttons" facility using a neat driver called "SPAD" (Saitek Panels Advanced Driver) written by Massimo ("Maxx"). Download this from <http://fstools.weebly.com>.

You might well ask why this facility is provided here at all when FS offers something similar. Well, these are the additional features available in FSUIPC4:

- The actions can be programmed differently for different aircraft or profiles. Just check the box "aircraft specific" or "profile specific" (if the profiles option has been pre-selected), and then everything you program will operate for the currently loaded aircraft only. Anything programmed without that checkbox selected will also be available, unless overridden by an aircraft-specific assignment.

- Buttons can be made to cause key presses. This is useful for accessing those FS add-ons which do not provide “controls” as such, but do react to keystrokes—for example, advanced panels such as those from PMDG and PSS, external programs such as Radar Contact, and many assorted utilities.
- The range of FS controls assignable here exceeds those that can be assigned in the FS Assignments dialogue (and the CFG file), and fixed parameter values can also be supplied with them so they can be used to set (fixed) values as well as operate switches.
- Controls aimed at other programs can be included. Currently these include Roger Wilco and Advanced Voice Client (both for push to talk functions), Project Magenta and generally any WideFS client programs via the WideClient “KeySend” facility.
- Sequences of actions, whether key presses, or FS controls, or a mixture, can be programmed. However, this facility can only be accessed by editing the **FSUIPC4.INI** file, as it would have made the FSUIPC4 options page too complex for most users. Full details for editing the Button programming in the INI file are provided in the Advanced User’s Guide.
- Compound (or conditional) button actions can be programmed—with the action of one or more buttons being determined by the state of one or more other buttons or switches. This can be used, for example, to program a bank of buttons for different things depending on a toggle or multiple position switch, hence multiplying the effective number of buttons available. The same facility can also be used to cope with those types of rotary switches that indicate which direction the spindle is being turned by the phase relationship between two button lines. Again, this more complex facility can only be accessed by editing the **FSUIPC4.INI** file, and is described in the Advanced User’s Guide.
- Button actions can be made conditional on values or bits in FSUIPC4’s offsets, opening up a whole realm of possibilities, such as different things to be done when on the ground as opposed to flying, or with engines running or not, and so on. These also need editing in the INI file and the facilities are described in the Advanced User’s Guide.

GoFlight equipment

GoFlight buttons and rotary dials can also be programmed here—but take care that you don’t have both Goflight and FSUIPC4 acting on the same buttons as FSUIPC4 is not able to override the original programming. For GoFlight buttons to be recognised you must have the GoFlight module (GFDev.dll) installed *either* in the GoFlight program folder (where the Gfconfig program is installed) *or*, possibly easier, just place a copy into the FSX Modules folder, alongside FSUIPC4.DLL.

If you install the latest version of the GoFlight software the correct DLL is installed automatically for you, but otherwise I provide one you can download from my Support Forum (by kind permission of GoFlight Inc).

GoFlight buttons will all have high “joystick” numbers in FSUIPC4. .

Note that GoFlight devices can be connected and disconnected and FSUIPC can handle the changes without reloading, *providing* you go to the Buttons tab and use the “reload” button there. This actually re-scans all USB joystick connections too.

PFC equipment controlled by PFCFSX.DLL

If you are using PFC equipment driven by my PFCFSX.DLL driver for FSX, then all the buttons, switches and digital rotary knobs on that equipment will also be visible and programmable here, just as if they were on joystick inputs. These will have Joystick numbers of 16 or higher, above the 0–15 range allowed for normal Game Port or USB joysticks in the Windows joystick interface. If you do program any PFC buttons here, the normal function in PFCFSX.DLL will not be applied. Normal PFC functions will be automatically resumed, however, when you delete the programming in FSUIPC4 (either by using the Clear button here, or deleting the entries in FSUIPC4.INI).

Remote buttons through WideFS

If you are a WideFS user, then with versions 6.22 or later of WideClient.EXE on the Client PCs, FSUIPC4 will recognise any Windows, EPIC or GoFlight buttons on any of the connected Client PCs. Each Client PC will add 1000 to the “joystick number”, so each will still be unique. More details about this feature are provided in the WideFS documentation.

Before attempting to use these facilities, please make sure that the buttons you wish to program are *not* already programmed to provide FS facilities in FS’s own assignments (see the menu entry Options–Controls–Assignments), or for GoFlight, in the Gfconfig program. If you want to program them here rather than there you must delete the assignments there, otherwise you will get both actions when you press the buttons.

Buttons connected via Aerosoft's 747 MCP

FSUIPC4 makes special provisions for third party button inputs, ones not seen through Windows joystick drivers, or the GoFlight drivers, or my own PFC driver. This is by a set of reserved "offsets" in FSUIPC's interface—0x3340 to 0x3363, to be exact (these are hexadecimal values, they would be 13120 to 13155 in decimal). This area allows up to 288 different switches or buttons to be recognised and programmed. All it takes is an application program to actually operate the bits in this area. I call these 288 button bits "virtual buttons", because they may not even relate to real ones—it is all up to the program driving them.

Not coincidentally, the Aerosoft MCP747 hardware allows the attachment and programming of up to 288 user buttons or switches. The Aerosoft driver is capable of being programmed to write to FSUIPC4 offsets, so these buttons can, if required, be further programmed in FSUIPC4.

I am not about to reproduce Aerosoft's documentation here, but will just give a few pointers for clarification, as some confusion has arisen. For this, I will take just one example—operating FSUIPC4's first virtual button. This is the first bit in the first byte and will be seen in FSUIPC4 as "joystick 64, button 0".

Right. Hexadecimal 3340 is decimal 13120. The "mask" (value) for the first bit is 1. You want that bit to turn on when you press the button, off when you release it. So, following the Aerosoft documentation you get an entry in its file like this:

13120,1,1,0,1,0,0,Virtual Button 1

According to the list of fields in the Aerosoft document:

Decimal address of variable 'in FS2002' (here it means in FSUIPC!) = 13120
Number of bytes in address = 1 (you only need 1 bit in fact)
ON value = 1 (to set the bit)
OFF value = 0 (to clear the bit)
16-bit mask = 1 (to avoid changing any other bits, I hope)
Special function code = 0, no repeat wanted
Special function value = 0, no special function
Description = whatever you like.

However, there is one other thing that it is very important to deal with. The Aerosoft driver allows any connected button to be treated, in its resulting actions, as one of the following (thanks go to Andrew McLean and Nico Kaan for this explanation):

Momentary: When the physical button is pushed, or the switch goes from off to on, the "momentary" function sends a "1" to the FSUIPC4 offset. When the button is released nothing is sent to FSUIPC4. That is, there is no "0" command sent at all. This mode may be useful for some things, but not really for FSUIPC4's virtual buttons. FSUIPC4 recognises buttons by the *change* in the bit from 0 to 1, but if it gets stuck at 1, that's it ... no more actions!

Toggle: When the physical button is pressed or switched turned on, a "1" is sent to FSUIPC4, and when it is released or switched off, a "0" is sent. This is *exactly* what would happen with a normal Joystick button, and it the one you should generally use with FSUIPC4's virtual button facilities.

Flip flop: This inverts the state of the bit when the button is pushed. In other words, if it is on, it will turn it off, if it is off, it will turn it on. You can use this in FSUIPC4 button programming if you need a button state which latches—i.e. you are using a button but really should have used a toggle switch. (FSUIPC4 can latch buttons for you, but only using button 'Flags' and editing the FSUIPC4.INI file for them—a subject covered in the Advanced User's documentation).

Programming the buttons

Okay, assuming now that you have a 'spare' button to program, and this is definitely not already assigned in the FS assignments or in GoFlight, you can proceed as follows:

1. First, please make sure that your device, the one with the buttons, is plugged in and working BEFORE running Flight Simulator. The Windows joystick interface used by FSUIPC4 to scan the buttons may not recognise any devices that are plugged in after Flight Sim has started. I know USB is supposed to be "hot pluggable", but this doesn't always seem to be the case with respect to running programs.
2. With the FSUIPC4 "Buttons" page showing, as above, check or uncheck the "Aircraft Specific" (or "Profile Specific" if the profiles option has been pre-selected) option, according to whether you want to edit buttons for this aircraft/profile only, or for global use. If you do select aircraft or profile specific you will see the name of the current aircraft or profile showing in the title bar of the options. (Note: *if you are using the abbreviated aircraft names option, this may be the abbreviated name that will be used. This option requires editing the FSUIPC4.INI file after programming, and is described only in the **Advanced User's** document*).

3. Now press the button you want to program. If it is visible to FSUIPC4 then it will be identified on the screen by Joystick Number (0–255 for local buttons) and Button Number (0–39). Please take careful note of the fact that this numbering starts at 0 *not* 1. Windows “Game Controllers” actually numbers from 1.

For buttons being pressed on a WideFS client PC there will be a much larger joystick number: plus 1000 for Client 1, 2000 for Client 2, and so on.

Note that FSUIPC uses the original FS convention of using button numbers 32–39 for the possible 8 directions on a “Point Of View” (POV) Hat. The directions are 32 (forward), then 45 degree increments clockwise to 39 = forward left. Please see the Box below for details of how to assign these buttons to imitate a full “point of view” Hat in FS.

If the “button” is in fact a toggle or rotary then you may need to toggle it or turn it twice. This is because, when programming (only) FSUIPC is only looking for changes from “off” to “on”, so it won’t see a change from “on” to “off”. This is necessary because of the way some multi-way switches work.

With the GoFlight rotaries there will be four different button numbers available—in sequence, fast left, slow left, slow right, fast right (i.e. like video recorder controls:

<< < > >>

To get the “fast” values you will have to turn the rotaries quite fast. Sometimes, though, turning them too fast seems to cause nothing to be seen! You need to experiment before committing any assignments.

Please note that rotary input is implemented by alternately setting a switch on then off. Each change will usually be one ‘click’ of the knob. If you want action on each and every click you will have to program the same thing on both the “press” and “release”. ***Do not set the repeat option with the rotary switches.***

4. If you had already programmed this button in FSUIPC for this aircraft (or globally if the aircraft/profile specific option isn’t checked), then the current programming details will be shown. If you had programmed sequences or mixed actions in the INI file, only the first action will show here and will not be editable—you can only do that in the INI file. Otherwise you can ‘clear’ all the programming or edit it as desired here.

Buttons assigned to custom controls, using numbers not names, and which don’t have a name known to FSUIPC, are shown as <n> where n is the number in decimal.

For an un-programmed button, select first whether you want to make it produce a keystroke, or an FS control. The actions then are different:

5. **Key press programming** is done by pressing the ‘Set’ button, for button press or release (or both, if you want) then entering the key press or combination you want. The value won’t appear until the key press is complete, but you can use combinations of **Ctrl**, **Shift**, **Tab**, **Alt** and one normal ‘graphic’ key.

Take care if you elect to use **Alt**, as this is always the Menu access key. If you want to use it to pull down a menu, then fair enough, but if you want to also select a menu entry you need a key sequence, programmable only in the FSUIPC4.INI file. (An example of this is actually given in the Advanced User’s Guide). Also FSUIPC cannot send keystrokes to FS dialogues—they are ‘modal’, which means nothing else in FS is actually running whilst they are shown, including FSUIPC4.

For a key press occurring when you press the button, you can program it to operate transiently—i.e. the key(s) are pressed and released almost immediately—otherwise the keys will be kept pressed until you release the button. **[Do NOT do this with ALT combinations]**.

If you have the keys kept pressed whilst the button is pressed, you can opt for the keys to be repeated, just as on the real keyboard. However, the repeat rate is fixed at around 6 per second.

If you set a key press to occur when the button is released, this is always a transient key press, with no repeats. The key press for button release does not have to be the same as the one on button press, and can be used on its own.

Note that key presses produced by FSUIPC4 using this facility are detectable as Hot Keys both by FSUIPC4 (see the Hot Key facility) and by any external program using the FSUIPC4/WideFS Hot Keys facility (see the FSUIPC4 SDK).

Also note that Roger Wilco or AVC users do not need to allocate the correct keypress as assigned in their voice program. Some versions of RW do not obtain keys in a way that FSUIPC4’s key press facilities can get to in any case. Instead, use the FS control programming part instead—special PTT commands have been added to the FS controls list specifically for this purpose (see below).

6. **FS Control programming** involves simply selecting the FS Control you want to occur from the drop-down list. Note that this list is very long, and is rather cryptic—the names here are mainly the names actually used in FS and are obtained from FS dynamically. The exceptions to this are custom controls, and special commands added by FSUIPC4.

Custom controls, without a name known to FSUIPC, can be assigned by selecting **<custom control>** from the drop-down list, and then entering its number in decimal (range 65536 to 131070 inclusive) or, if you wish, in hexadecimal preceded by an **x** (range x10000 to x1FFFE). Decimal will be displayed when re-viewed no matter how it is entered.

The special controls or commands added by FSUIPC are all listed in the Advanced User's guide, but include all these and more:

- Two controls to operate the Roger Wilco (RW) and Advanced Voice Client (AVC) “push to talk” facilities (more below).
- Controls to operate the “PVT” private voice push-to-talk facility in Squawkbox 4.
- Controls to operate Squawkbox 4's transponder standby/mode c signal, and the transponder ident.
- A control for switching Comms transmission between COM1 and COM2.
- Three controls to handle FSUIPC4's “button flags”, used in conditional button programming. *Button flag clear, set and toggle* are programmable both here and in the **Keys** programming page, but they can only be used in complex button programs by editing the FSUIPC4.INI file. This is described fully in the Advanced User's Guide.
- A control for sending **KeySend** messages to WideFS clients running on other PCs. The specific KeySend number is set as a parameter (1–255) and is equated to a key press directed to a client program in the relevant WideClient.ini file. Just be sure to set the parameter for the KeySend control to the same number (“N” in KeySendN=...) used in the WideClient.ini file, as it is this which related the two. (Please see the WideFS documentation for more details of its KeySend facilities).
- A **"Nothing"** control which can be assigned in aircraft-specific or profile-specific cases to prevent operation of a generally assigned button which is needed for purposes outside of FSUIPC for those specific aircraft.
- Optionally many extra controls for Project Magenta modules. To see the PM controls in the drop-down lists check the option box on the page. All the Project Magenta entries start with “Pm” and the Airbus-specific ones “Pm Ab”. A list of those supported is provided in the FSUIPC4 Advanced Users Guide.
- An **Autobrake Set** control, to directly set the autobrake (0=RTO, 1=off, 2–5=settings to Max).
- A set of “fast” FS autopilot value increment/decrement controls. These add to the default FS “inc” and “dec” controls with ten times the increment. Values handled are Altitude, Speed, Mach, V/S, Heading, and both OBIs (Courses).
- A set of controls to adjust the in-use radio frequencies directly, as well as controls to set the transponder using only two dials instead of four.
- A **Traffic density set** control, which sets the FS AI airline traffic density to any value from 0 to 100% according to the parameter value provided. The GA and shipping densities are adjusted to, in the same proportions, but the airline value is the guide.
- A **traffic density toggle** control, which turns the AI airline traffic off (density = 0) if it is on, but if it is already off it turns it on, using the density value provided in the parameter *or* 100% if that is omitted or set zero. This also operates on the GA and shipping traffic.
- A **traffic zapper** control which deletes an AI aircraft close to and directly in front of the user's aircraft.
- **Spoiler inc** and **Spoiler dec** controls, which raise or lower the spoilers (speed brakes) by a small amount on each use. The increment is set, by default, to give 32 steps in the whole range, but you can change that in the FSUIPC4.INI file—see the Advanced User's document.
- **Freeze pos** controls (on, off and toggle) to freeze the aircraft's geographical position (latitude/longitude) but allowing it to otherwise fly normally, including altitude changes. [*However, please note that FSX actually comes with its own control for this, though I've not yet tried it*].
- **Engine N Autostart:** Separate engine auto-start controls.
- **Throttles on, off, toggle:** Controls to disconnect and re-connect throttle inputs.
- An assortment of controls to handle Lua plug-ins, including starting and 'killing' them, and setting flags for them to test and parameters for them to use.
- **Mouselook on, Mouselook off, Mouselook toggle**, to control the optional FSUIPC4 mouse look facility.
- **Offset** controls, which allow values to be written to FSUIPC4's offsets, for all sorts of actions and effects. There are controls for byte (8 bit), word (16-bit), double word (32-bit) and both 32-bit and 64-bit floating point values, and

facilities for bit setting, clearing, toggling, incrementing and decrementing (the latter two only for byte and word values). When using these, another input field appears on screen for the entry of the specific offset, which is best entered in hexadecimal (precede the value with the letter 'x'). The value is provided as a parameter and this too can be entered in hexadecimal, preceded by 'x'. For full information on these please refer to the Advanced User's documentation.

Offset Increment/Decrement Controls

The increment/decrement controls operate on signed (Sbyte, Sword) or unsigned values (Ubyte, Uword), and have a more complex parameter that specifies both the increment/decrement (always positive) and a limit, thus:

<increment value> / <limit>

This allows things like Trim adjustments to be programmed to be whatever speed you like, or even multiple speed if you have enough buttons or levers to spare. Taking Trim as the example:

The elevator trim is a signed WORD at offset x0BC0. For this sort of information you'd need the Programmer's Guide in the FSUIPC4 SDK. Its range is -16383 (full trim down) to 16383 (full trim up). So, when programming your button/levers:

1. Select the "Offset SWord Increment" control to program the nose up trim.
2. Enter x0BC0, or just xBC0 into the offset edit box.
3. Enter 256/16383 in the parameter box. The 256 is the increment and 16383 is the limit. This will give 128 steps between -16383 and +16383 inclusive ($32768 / 256 = 128$). If you want a faster, coarser trim adjustment specify a larger increment, and of course vice versa for a slower, finer adjustment.
4. You'll probably want it repeating whilst held, so check that too (*but never set repeat for rotary switches which can be left in an 'on' position, nor latching switches*).
5. Do the same for the decrement, with a parameter of 256/-16383 (-16383 being the lower limit). Note that the decrement is still positive—you can only provide positive numbers for this part. It is the definition of increment or decrement which controls the addition or subtraction.
6. When reviewing such assignments you may see the parameters showing in hexadecimal (preceded by 'x'). This is an optional way of inputting these in the first place, just as with the offsets.

Note: This technique can also be applied to the rudder and aileron trims. Select "Offsets sword increment" with 256/16383 as the parameter to trim the aircraft to the right, and select "Offset sword decrement" with 256/-16383 as the parameter to trim the aircraft to the left. Enter x0C04 for rudder trim or x0C02 for aileron trim into the offset edit box, and then proceed as 3 to 5 above.

For some help in untangling the real Flight Sim controls you can refer to my "FSX Controls" document, which is included in the files installed for you into the FSX Modules folder. It is in PDF form (for reading with Adobe Acrobat). For FSUIPC4 added controls refer instead to the Advanced User's Guide.

The best way to work them out, really, is to try them—pick one that seems to indicate that it may do what you want, and see if it does. I know for sure that some of them do not work, or at least do not work the way you might hope or expect.

Most if not all of those with the word "set" in their name are controls that take a parameter. Axis controls are like this of course, but so are, for example, the controls "MAGNETO SET" and the equivalents for each of four separate engines. Note that these do not necessarily work—if fact I don't think the MAGNETO controls work as they should.

Naturally, there is no way FSUIPC can dynamically provide different parameters for a single button. You can have a single button send a control with a fixed parameter—you specify this in the parameter field. A good example is a button to set the "standard barometer" setting (1013.2 hPa or 29.92"), for flying Flight Levels. For this, select:

Kohlsman Set	as the control, and
16211	for the parameter ($1013.2 \text{ mb} \times 16 = 16211$)

Another useful example is a button to exactly centre the elevator trim:

Elevator Trim Set	is the control, and
0	is the parameter

Again, as with key presses, you can have a separate control sent when you release the button, and you can also specify that the earlier control should be sent repeatedly whilst the button is held. A typical use of different controls on button press and release is for Views, from a Hat. For example:

Button 33 (forward right) might be programmed with

View Forward Right	on press
View Forward	on release

If you want to mix key presses and FS controls, or send a sequence, you need to edit the FSUIPC.INI file. This is described in the Advanced User's Guide.

For Roger Wilco or Advanced Voice Client (AVC) users, at least those running the voice program on the same PC as FS, you do not need to try to allocate the correct keypress as assigned in that program. Some versions of RW do not obtain keys in a way that FSUIPC's key press facilities can get to in any case. Instead, just scroll down the FS controls list for the pair "Ptt Transmit Off" and "Ptt Transmit On". Set the press of your button to operate the "On" and the release to operate the "Off". This is known to work with all currently available versions of Roger Wilco and with recent versions of Advanced Voice Client.

Finally, if you want to clear ALL the FSUIPC button programming, without pressing each button and pressing "Clear" in turn, just delete the complete [Buttons] section (for global buttons) and [Buttons.<aircraft name>] sections (for aircraft-specific buttons) in FSUIPC.INI. Try to do this when FS is not running. Most changes to the INI file are only noticed by FSUIPC when FS is started, though both the Keys and Buttons sections are reloaded when you change aircraft.

Example of assignments for HAT programming for smooth panning

For FS2004 (should work in FSX too):

Assuming 'j' is the joystick number on which the Hat to be programmed is situated:

Push forward: program button j,32 as PAN UP on press, to repeat, and PAN RESET COCKPIT on release
Push forward & right: program button j,33 as PAN RIGHT UP on press, to repeat, and PAN RESET COCKPIT on release
Push right: program button j,34 as PAN RIGHT on press, to repeat, and PAN RESET COCKPIT on release
Push back & right: program button j,35 as PAN RIGHT DOWN on press, to repeat, and PAN RESET COCKPIT on release
Push backward: program button j,36 as PAN DOWN on press, to repeat, and PAN RESET COCKPIT on release
Push back & left: program button j,37 as PAN LEFT DOWN on press, to repeat, and PAN RESET COCKPIT on release
Push left: program button j,38 as PAN LEFT on press, to repeat, and PAN RESET COCKPIT on release
Push forward & left: program button j,39 as PAN LEFT UP on press, to repeat, and PAN RESET COCKPIT on release

For those familiar with the INI file parameters, this could look something like this (with comments added and joystick #0 assumed):

```
1=R0,32,C65734,0 ; PAN_UP
2=U0,32,C66415,0 ; PAN_RESET_COCKPIT
3=R0,33,C65856,0 ; PAN_RIGHT_UP
4=U0,33,C66415,0 ; PAN_RESET_COCKPIT
5=R0,34,C65672,0 ; PAN_RIGHT
6=U0,34,C66415,0 ; PAN_RESET_COCKPIT
7=R0,35,C65857,0 ; PAN_RIGHT_DOWN
8=U0,35,C66415,0 ; PAN_RESET_COCKPIT
9=R0,36,C65735,0 ; PAN_DOWN
10=U0,36,C66415,0 ; PAN_RESET_COCKPIT
11=R0,37,C65855,0 ; PAN_LEFT_DOWN
12=U0,37,C66415,0 ; PAN_RESET_COCKPIT
13=R0,38,C65671,0 ; PAN_LEFT
14=U0,38,C66415,0 ; PAN_RESET_COCKPIT
15=R0,39,C65854,0 ; PAN_LEFT_UP
16=U0,39,C66415,0 ; PAN_RESET_COCKPIT
```

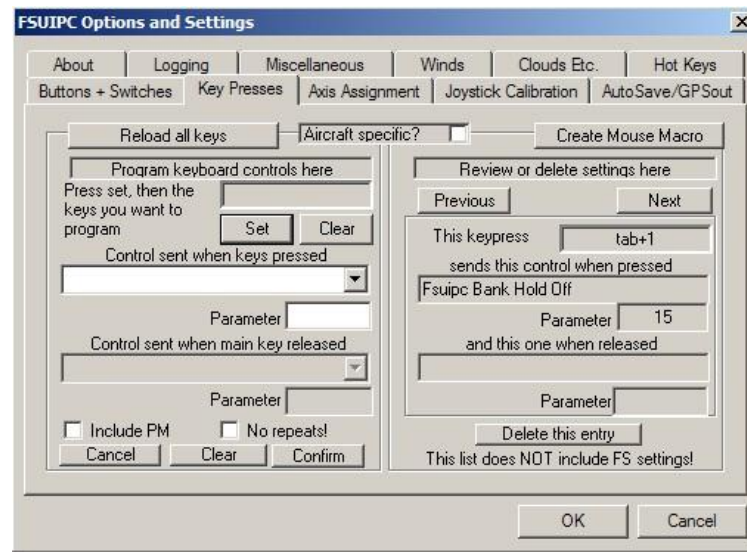
For FSX (may work in FS2004 too?):

A suggested method for FSX is very similar to the one above, but uses "PAN_VIEW" with a parameter of -1 to restore the *previous* view in Virtual Cockpit mode, rather than straight ahead:

```
1=R0,32,C65734,0 ; PAN_UP
2=U0,32,C66416,-1 ; PAN_VIEW -1
3=R0,33,C65856,0 ; PAN_RIGHT_UP
4=U0,33,C66416,-1 ; PAN_VIEW -1
5=R0,34,C65672,0 ; PAN_RIGHT
6=U0,34,C66416,-1 ; PAN_VIEW -1
7=R0,35,C65857,0 ; PAN_RIGHT_DOWN
8=U0,35,C66416,-1 ; PAN_VIEW -1
9=R0,36,C65735,0 ; PAN_DOWN
10=U0,36,C66416,-1 ; PAN_VIEW -1
11=R0,37,C65855,0 ; PAN_LEFT_DOWN
12=U0,37,C66416,-1 ; PAN_VIEW -1
13=R0,38,C65671,0 ; PAN_LEFT
14=U0,38,C66416,-1 ; PAN_VIEW -1
15=R0,39,C65854,0 ; PAN_LEFT_UP
16=U0,39,C66416,-1 ; PAN_VIEW -1
```

Thanks to Barrie for this idea and its testing.

Keys



Normally you will assign keys to Flight Sim operations in the Options–Controls–Assignments dialogue in FS itself, or possibly by directly editing the FS CFG file. However, there are more controls than are assignable in that way, and the assignments cannot be made conditional on the current aircraft (for instance)..

FSUIPC4 therefore offers its own way of assigning keystrokes. In this page you can assign simply single keys or combinations of those with Shift, Control, Tab, Menu and Win. (The “Win” key is either of the keys marked with the Windows symbol, and needs to be used with one of the others held down first, whilst the “Menu” key is the one with a menu icon on it, to the right of the right-hand Windows key).

The Alt key is also available for such combinations, but its use is not advisable unless you always have the FS menu showing—otherwise any use of ALT will bring up the menu bar even if the combination you are using does not invoke a menu item.

If you assign keystrokes to FS controls here, those keystrokes will not be seen by FS’s own keystroke assignment programming, so you can either use FSUIPC4 to supplement the normal assignments (recommended), or to replace them altogether (take care).

Hot Keys assigned elsewhere, in FSUIPC4’s Hot Key page or by external programs, take precedence over these assignments just as they do over FS assignments.

Key press actions can be made conditional on values or bits in FSUIPC4’s offsets, opening up a whole realm of possibilities, such as different things to be done when on the ground as opposed to flying, or with engines running or not, and so on. These need editing in the INI file and the facilities are described in the Advanced User’s Guide.

Okay, on with the show. Looking at the Keys option page, above (or on your screen), you’ll see that it is divided into two parts. The left side is where you will add assignments or modify existing ones. The right side is only used to review or delete existing assignments (in FSUIPC4 *only*).

You can assign keys to operate globally, with all aircraft, or to operate only when the current aircraft (or by profile) is loaded. This selection is by unchecking or checking the “Aircraft Specific” (or “profile specific” if the profiles option has been pre-selected), selection. Do this first, before starting to program or review key settings. If you program a key both for global and specific use, the latter prevails whenever the aircraft is loaded—you don’t get both actions simultaneously. If you do select “aircraft/profile specific” you will see the name of the current aircraft or profile showing in the title bar of the options. (Note: *if you are using the abbreviated aircraft names option, this may be the abbreviated name that will be used. This option requires editing the FSUIPC4.INI file after programming, and is described only in the **Advanced User’s** document*).

To assign an action to a keypress, press the **Set** button in the left hand panel. The edit box above displays “PRESS KEY”. Press your key combination, for example TAB+Q, and you will see it displayed. Nothing is displayed until you have completed the combination with a graphic, cursor or function key. Shift-type keys (and Tab) cannot be used alone.

You can now assign an action to that key press. You can also assign an action to be carried out upon the key release—but this is not implemented *unless* you have an action for the press. In other words, you can have a single action, which occurs when

the key is pressed, or a dual action, one when it is pressed and another, probably different, when released. The dual facility tends to be only useful for holding temporary situations, like views or additional windows.

Additionally, whilst, like FS itself, FSUIPC will normally act upon repeated keypresses (the result of holding a key down) as if they are requests for repeated “press” actions, you can ask it to ignore such repeats. To do this, just check the **No repeats!** checkbox which you will see near the bottom.

Use the drop-down control list to find the control you want to assign. Note that this list is very long, and is rather cryptic—the names here are mainly the names actually used in FS and are obtained from FS dynamically. The exceptions are some special commands added by FSUIPC. The latter include:

- Controls to operate the Roger Wilco (RW) and Advanced Voice Client (AVC) “push to talk” facilities (see earlier). These work with Squawkbox4 too.
- Controls to operate the “PVT” private voice push-to-talk facility in Squawkbox 4.
- Controls to operate Squawkbox 4's transponder standby/mode c signal, and the transponder ident.
- A control for switching Comms transmission between COM1 and COM2.
- Three controls to handle FSUIPC4's “button flags”, used in conditional button programming. *Button flag clear, set and toggle* are programmable both here and in the **Keys** programming page, but they can only be used in complex button programs by editing the FSUIPC4.INI file. This is described fully in the Advanced User's Guide.
- A control for sending **KeySend** messages to WideFS clients running on other PCs. The specific KeySend number is set as a parameter (1–255) and is equated to a key press directed to a client program in the relevant WideClient.ini file. Just be sure to set the parameter for the KeySend control to the same number (“N” in KeySendN=...) used in the WideClient.ini file, as it is this which related the two. (Please see the WideFS documentation for more details of its KeySend facilities).
- A **"Nothing"** control which can be assigned in aircraft-specific or profile-specific cases to prevent operation of a generally assigned key which is needed for purposes outside of FSUIPC for those specific aircraft.
- Optionally many extra controls for Project Magenta modules. To see the PM controls in the drop-down lists check the option box on the page. All the Project Magenta entries start with “Pm” and the Airbus-specific ones “Pm Ab”. A list of those supported is provided in the FSUIPC Advanced Users Guide.
- An **Autobrake Set** control, to directly set the autobrake (0=RTO, 1=off, 2–5=settings to Max).
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- **Freeze pos** controls (on, off and toggle) to freeze the aircraft's geographical position (latitude/longitude) but allowing it to otherwise fly normally, including altitude changes. [*However, please note that FSX actually comes with its own control for this, though I've not yet tried it*].
- **Engine N Autostart:** Separate engine auto-start controls.
- **Throttles on, off, toggle:** Controls to disconnect and re-connect throttle inputs.
- An assortment of controls to handle Lua plug-ins, including starting and 'killing' them, and setting flags for them to test and parameters for them to use.

- **Offset** controls, which allow values to be written to FSUIPC4's offsets, for all sorts of actions and effects. There are controls for byte (8 bit), word (16-bit), double word (32-bit) and both 32-bit and 64-bit floating point values, and facilities for bit setting, clearing, toggling, incrementing and decrementing (the latter two only for byte and word values). When using these, another input field appears on screen for the entry of the specific offset, which is best entered in hexadecimal (precede the value with the letter 'x'). The value is provided as a parameter and this too can be entered in hexadecimal, preceded by 'x'.

For more details of the **Offset Increment/Decrement** controls, please see the Boxed section under **Buttons**, earlier.

For some help in untangling the real Flight Sim controls you can refer to my "FSX Controls" document, which is included in the files installed for you into the FSX Modules folder. It is in PDF form (for reading with Adobe Acrobat). For FSUIPC4 added controls refer instead to the Advanced User's Guide.

The best way to work them out, really, is to try them—pick one that seems to indicate that it may do what you want, and see if it does. I know for sure that some of them do not work, or at least do not work the way you might hope or expect

Most if not all of those with the word "set" in their name are controls which take a parameter. Axis controls are like this of course, but so are, for example, the controls "MAGNETO SET" and the equivalents for each of four separate engines. Note that these do not necessarily work—if fact I don't think the MAGNETO controls work as they should.

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Kohlsman Set	as the control, and
16211	for the parameter (1013.2 mb x 16 = 16211)

Another useful example is a key to exactly centre the elevator trim:

Elevator Trim Set	as the control, and
0	is the parameter

If you want, you can make FSUIPC4 send a sequence of FS controls when you use a key press, but for this you will need to edit the FSUIPC4.INI file. This is described in the Advanced User's Guide. You can only edit or program the first such control in the dialogue.

The review and deletion facility forms the right-hand part of the options page. Here you can simply scan through all your FSUIPC4 assignments (*not* those made in FS's dialogue or CFG file). The list is shown in the order they appear in your FSUIPC4.INI file, and cycles back to the beginning at the end and vice versa. You can delete any assignment here by using the **Delete this entry** button.

Finally, if you want to clear ALL the FSUIPC4 key press assignments, without pressing "Delete this entry" for every one, just delete the complete [Keys] section (for global keys) and [Keys.<aircraft name>] sections (for aircraft-specific keys) in FSUIPC4.INI. Try to do this when FS is not running. Most changes to the INI file are only noticed by FSUIPC4 when FS is started, though both the Keys and Buttons sections are reloaded when you change aircraft.

Mouse Macros

IMPORTANT NOTES: *These facilities need FSX with at least the SP1 update incorporated. Macro files should work with the original version of FSX, but the easy user macro creation facilities will not be available.*

Furthermore, in order to work they need to be able to hook into Gauge code which must be structured in the predictable way which results from using the Microsoft FS SDK for building gauges in C or C++. This unfortunately excludes most of Microsoft's own default FSX aircraft, as they did not use this technique. Furthermore, most new aircraft made by third parties use the more recent technique of having gauges in XML. Those are also not susceptible to "Mouse Macros". (but they are then more likely to be accessible via "L:Vars", which is a separate and more advanced subject).

In addition to all of the available FS controls, and the specially provided FSUIPC4 additions, you can easily make your own controls, naming them yourself, to operate some (sorry, not all) of those Panel switches and buttons and knobs which otherwise you would have to use the mouse to use.

These “mouse macros” do not actually use the mouse at all, but use a set of “mousetraps” to identify how your own mouse use calls routines in the panel coding, and then attempts to replicate it.

This is done once for each mouse action you want to replace with a button or keypress operation, and it merely involves running FSX with FSUIPC4 in a special “mousetrap” mode. The macro files needed are actually created for you, with your filenames and your control names. Once you’ve created some, the drop-down lists of controls in both the Keys and Buttons tabs of FSUIPC4 will include them for you to assign as you wish. Macros appear in the list with the full name:

file: macro

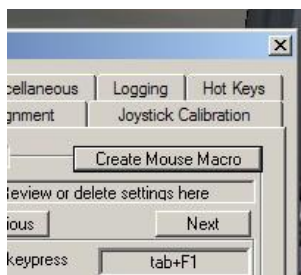
so if you generated a series of mouse macros for, say, a 767, you might call the file “767”, with, perhaps, the APU switch called “APU”. The control would then be listed as:

767: APU

Since all of the listed controls are sorted into alphanumeric order, all of the 767: ... controls would be there together, easy to find and assign.

Okay. Let’s take the creation of such Macros step by step. The example here is actually for the default FSX Beech King Air, where we will program two buttons otherwise only mouse-accessible. [Note that most FSX default panels are not amenable to FSUIPC4’s mouse actions]

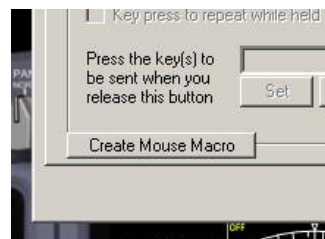
Go into the FSUIPC4 options, and select either the Keys or the Buttons tab (at this stage it doesn’t matter which—you can create the macros for use in either from either tab).



Assuming you are using an updated installation of FSX (i.e. at least SP1) you will see a “**Create Mouse Macro**” button.

On the Keys tab it is top right, as shown here on the left (as it happens), and on the Buttons page it is at the bottom left (but here shown to the right of this text. Oops!).

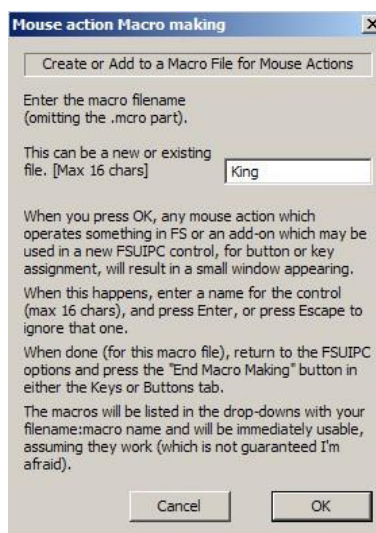
Okay ... as soon as you press this button you will be presented with the rather wordy dialogue box shown below:



This does actually explain what is going to happen, but I shall do it again here in different words, just so it is clear.

All you do in this dialogue is decide on the **name** for your macro file. This is the part which is the prefix to the controls you will be adding, so you want to choose it to be brief but to clearly indicate what it is for. There’s a maximum size of 16 characters, and you cannot use any which are not valid in a filename. When the file is actually created it will have the filetype “.MCRO” appended and it will reside in your FSX Modules folder.

The file can be one which already exists. You cannot edit or change any existing macro specifications in an existing file this way, but you can certainly add to them. In fact when you use the same macro name (we’ll come to that) the new mouse action is added to the existing actions for that name—actually generating



multi-line macros where maybe several different things are accomplished by the same add-on control. All that without editing a file directly!

Okay, on with the example. As you can see, I chose the name “King” for these few controls we will be adding. Press “OK” and the wordy dialogue disappears, and the **Create Mouse Macro** button changes to **End Macro Making**. If you pressed this now you’d not get any new macros, but any existing macro files will be reloaded. Don’t press it, just press “OK” or “Cancel” to leave the FSUIPC4 options.

FSUIPC4 has now set up some “mousetraps”, and whenever you click the mouse, or use its wheel, on any part of the screen where FSUIPC4 *thinks* it might be able to provide a control, you will get a multiline message popping up on screen. (I know the term *thinks* isn’t very precise here, but the true explanation is too technical and not warranted here). Here are two examples, one for each of the switches I am using as useful examples:



First thing you’ll notice is that one is in white on green, the other red on green. The colours alternate between the two colours each time the data in them is changed, or refreshed, due to further mouse action. This shows you whether your mousing has any effect on FSUIPC’s traps or not. If you click somewhere which is not programmable, the window disappears.

The left-hand one above is from pressing Master Warning button, the red one on the glareshield. The right-hand one (the red one) is from the Master Caution button next to it. You can see I’ve entered my control name for that one, ‘Caution’.

Some explanation of the window contents:

The first line is easy: it is just reminding you of the Macro file being created or added to.

The second and third lines show technical details relating to the specific place on the panel you clicked, or whatever. The module is the Gauge or DLL affected, and the other details either give a relative “rectangle” number or a function offset. You need not worry about either, but if you want more details these are explained further in the Advanced User’s guide.

The fourth line is important:

Press TAB to test.

This is something you should most certainly do IF you want to use this particular control. There is no point in giving it a name and having it added to the Macro file if it isn’t going to work! So, press TAB. Check that when TAB is pressed, the same thing happens on your panel as when you used the mouse. If it does, well and good. If not, then look in the data window for a little label in the form “(n of n)” — for example “(1 of 4)”. If this is present this means that the mouse click may use one of several (4 in this case) different ways into the same routine, and FSUIPC4 is unable to tell which is correct.

When this occurs, you still use TAB to test as usual. Of course, if it works the correct switch in the correct way, just continue to name it as described next. If not, click that *same* switch again -- it will change to “2 of 4” (say). Then re-test using TAB. And so on. Only when the correct action occurs when pressing TAB do you want to name the macro and move on.

The main example of this multiple-entry problem I’ve found so far is on the throttle quadrant in the PMDG 747 (both FS9 and FSX versions). The four fuel cutoff/idle switches are 1, 2, 3 and 4 (of 4), with otherwise the same details. With this facility, programming these switches becomes easy to deal with!

If the multiple-entry business doesn’t apply, then I’m afraid this is one of those cases which cannot be supported this way—probably the internal code for the facility uses special private data which is just not accessible to FSUIPC4 (or, rather, is not understood by FSUIPC4). **BUT all might not be lost! Please see the boxed notes below for possible ways around this for some gauge implementations.**

So, try the mouse click on the VOR/ADF switches, using the TAB to test, then enter the names using the keyboard and press Enter when you’ve done. The name is limited to 16 characters, and you can use backspace to correct an error, or delete to start afresh.

Or, press ESCape (or simply click the mouse elsewhere) to abandon this particular control.

That’s almost it. Keep doing this for all the functions you want. If you have similar functions on several different aircraft you can load each such aircraft in turn and do the same for each, even giving the same names for the macros. Such macros will become “multi-lined”, but in each case only the line relating to currently loaded gauges will operate.

When you've finished adding macros, go back to the FSUIPC4 Keys or Buttons options, and click that **End Macro Making** button. The file will be written, and then loaded into FSUIPC's keys and buttons drop-downs ready for use.

One final note: these controls will operate when the relevant gauge or module is loaded irrespective of whether the panel part affected is visible or not. This is usually quite acceptable and desirable, but in cases where it isn't there is a way to prevent it. You have to edit the MCRO file and add a line "Window=..." giving the Window title. You can get this from the Panel.CFG file in the section [Window Titles]), or simply by going to the FS Views-Instrument Panel menu and using the name there. For instance "Window=Main Panel" would be correct for the macros in our example. However, if you do this you will not be able to combine macros for several panels or panel parts. Each Window needs its own .MCRO file.

Variations for Mouse activated switches which might be made to work by editing the Macro file

From experimentation, it seems that some switches operate not only from the mouse button being *pressed*, but also (or instead) when it is *released*. Because of the way I've tried to semi-automate the creation of macros, it is not possible for FSUIPC to detect these—especially when the action of the button pressed is to hold a spring-loaded switch in order to operate a starter, for example.

The only way to deal with these is to make the macro, as described above, and follow it through to completion but ignoring, for now, the failure of the “TAB test”. End the macro making session via the options, then load the macro file into a text editor, such as Notepad. The file will be named “xxxx.mcro”, where “xxxx” is the name you gave it.

The file will look something like this (from a real example, but from FS9 and FSUIPC3 at present):

```
[Macros]
Module="XXXXXXXXX.GAU"
1=APU Start=RX70280*X8bcc
2=APU Normal=RX70280*X8bcc
3=APU Off=RX70310*X8bcc
4=L Eng Start=RX4a470*X8bcc
5=R eng Start=RX4a4f0*X8bcc
6=XTIE=RX66560*X8bcc
```

These just happen to be the only awkward switches and buttons on a popular add-on aircraft. Here, the APU Start and APU Off macros merely get the switch stuck in those positions – it doesn't spring back to centre. The Engine start and XTIE switches just make a click and do nothing else.

The problem with the APU starter is that the macro generated for the “Off” position is actually the same as that for the Start one – it could have been the same as the “Off” one if the macros had been created in a different order. What is happening here is that the gauge is detecting the release of the mouse button, and the FSUIPC macro isn't reproducing that.

The macro facility is actually equipped to indicate variations on the mouse action, and this is achieved by appending another number. The numbers relevant here are 11 meaning “leave” and 17 meaning “release”

It isn't possible to know in advance which of these, if either, are needed. It might even be both. Experimentation is needed.

Before we start experimenting, prepare the file for multiple-line macros, as follows:

```
[Macros]
Module="XXXXXXXXX.GAU"
1=APU Start=RX70280*X8bcc
2=APU Normal=
2.1=RX70280*X8bcc
3=APU Off=RX70310*X8bcc
4=L Eng Start
4.1=RX4a470*X8bcc
5=R eng Start
5.1=RX4a4f0*X8bcc
6=XTIE
6.1=RX66560*X8bcc
```

All I've done here is changed the lines we know don't work by leaving the name on its own line, and inserting the extra .1 lines with the mouse action assigned. The file is actually identical in its effect to the original, but now we can add more actions.

With the “APU Normal” switch, we want it to return to the normal position on button “leave” or “release” from either “Start” or “Off”. So the first thing to do is extend its part with the Off code as well, so it does both:

```
2=APU Normal=
2.1=RX70280*X8bcc
2.2=RX70310*X8bcc
```

By experimentation, the solution for this is the “leave” code, 11:

```
2=APU Normal=
2.1=RX70280*X8bcc,11
2.2=RX70310*X8bcc,11
```

This works! But it turned out that the other three needed ,17:

```
4=L Eng Start
4.1=RX4a470*X8bcc
4.2=RX4a470*X8bcc,17
5=R eng Start
5.1=RX4a4f0*X8bcc
5.2=RX4a4f0*X8bcc,17
6=XTIE
6.1=RX66560*X8bcc
6.2=RX66560*X8bcc,17
```

There, all done.

When you are trying things and testing the results, remember that you can edit the MCRO file then go into FSUIPC's Buttons or Keys tab and tell it to reload the settings. It will re-process your MCRO files including any changes. You don't have to keep reloading FS.

Axis assignments

Assignment of joystick buttons, joystick levers (called axes here) and key presses can all be done, quite normally, in FS via the Options-Controls-Assignments dialogues. We have already seen that FSUIPC4 can expand upon the assignment of Buttons and Key presses, allowing a much wider range of controls to be assigned, including special ones added by itself, and, quite usefully, allowing different assignments for different aircraft, automatically changing when aircraft are loaded.

In this section we shall see that the same flexibility can be achieved with the assignment of joystick axes too. Axes are those devices which provide a variable parameter rather than just an 'on' and/or 'off' event like a button, keypress, or switch. Most axes are controlled by the joystick or yoke itself (for aileron and elevator control), rudder pedals, analogue brakes, and those levers or push-pull rods associated with throttle, mixture and propeller pitch controls.

NOTE that you do *not* have to assign axes in FSUIPC4 in order to be able to use the joystick calibration facilities. For most normal uses it is perfectly acceptable, and easier, to assign as normally in FS itself, then, if you wish, calibrate in FSUIPC. The only strong reason for using FSUIPC4 assignments is when you want to be rather more ambitious with axes, possibly having different assignments for different aircraft or aircraft types ("profiles"), or having multiple assignments to the same controls, or using separate reverser or tiller axes. If you want things to remain simple, please skip this chapter and go on to Joystick Calibration.

Right. If you are still here, let's press on ...

FSUIPC4 offers a greater range of controls for axis assignment, and can make them aircraft-specific too. Further, it can cause non-axis controls to be sent as the axis parameter passes into, out of, or through specific calibrated areas of the axis range. It can even produce multiple FS control inputs for one axis input—up to four axis results into FS, thus allowing single lever control of multiple engines, in different configurations according to the aircraft loaded. It even offers a facility to insert a delay in the sending of axis values to FS—apparently this is needed for accurate simulation of some helicopter models. This latter facility, however, can only be set by editing the FSUIPC.INI file, and is described in the Advanced User's document, not here.

One additional axis of note is the **Steering Tiller**. Note that FSX does actually provide a Steering Axis which can also be assigned and calibrated in FSUIPC4. The FSX offering may be better with some aircraft. You'll need to choose.

The FSUIPC4 version still uses the FS Rudder control, but can be calibrated separately (e.g. to be more responsive—use the inverse S-shaped slope options). If the steering tiller axis is assigned, you must then calibrate it in FSUIPC4's Joysticks section (this is on the same page as the PAN controls ... sorry!). You need to calibrate the rudder axis in FSUIPC4 too. Then the two are used together as follows:

When on the ground and at any ground speed less than 60 knots (default—adjustable by the **MaxSteerSpeed** parameter in the INI file), the actual FS rudder action is controlled by a blend of the tiller and rudder axis inputs. At low speed it is predominantly tiller (with a minimum contribution from the rudder input of 10% of its deflection), and as speed increases the tiller becomes gradually less effective and (above 6 knots) the rudder input more so. Above the **MaxSteerSpeed**, or in the air, the tiller has no effect.

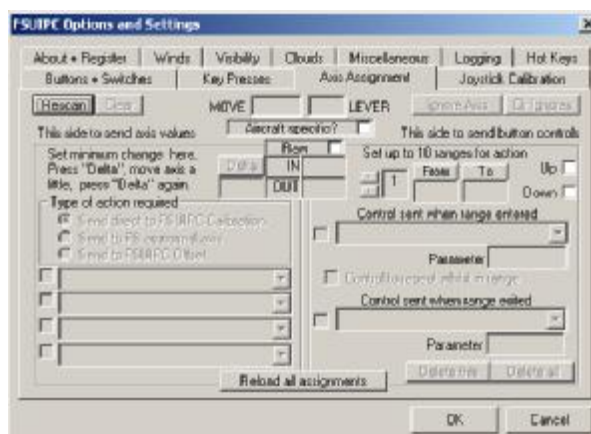
As with all of the axis and joystick facilities, the calibrations, assignments and parameters such as **MaxSteerSpeed**, can be different for different aircraft. The **MaxSteerSpeed** parameter actually has several options which can control the rate at which the blending occurs, so it doesn't have to be linear. Please refer to the Advanced Users guide if you want to know more.

IMPORTANT: Before making any assignments in FSUIPC4, you should be sure that the same axes are not being assigned in FS itself. This isn't as easy as it sounds, because when FS sees a new control attached it does automatic assignments. If you just want to use FSUIPC4 to program the odd axis, but leave the rest to FS, then it is best to just go into FS's assignment dialogues and de-assign the axis you want FSUIPC4 to handle. But be sure to check this on your next load of FS, just in case it gets reassigned automatically. It does happen—*especially* if you are in the habit of unplugging your USB devices!

The other reason you may want FS to handle some axes rather than FSUIPC4 is for Force Feedback. FSUIPC4 does not use the same methods to access joysticks as FS and does not support Force Feedback.

If Force Feedback isn't a requirement, and you want the maximum flexibility (and most efficiency—I believe FSUIPC4's joystick handling is *still* actually faster than FS's), then the best way forward is to disable FS's joystick facilities altogether, then program all buttons and axes in FSUIPC4.

Okay. Now load FS and go to FSUIPC4's options. Select the Axis Assignment tab, and you will see this:



This does look a bit daunting, and maybe messy too. But please bear with me. It is very functional, I have made things look familiar where the facilities are similar to those in other sections.

The main reason there is a cluttered look to this section is that there's a lot going on: the facilities are very flexible and powerful. To make things easier to follow I will include rather more pictures here than I usually do. First, let's start at the top with this little section:



Here I have a device attached and I have moved one of its axes—the “Y” axis, or elevator (usually). Note that, because axes are providing data all the time, quite often on entry to this section of FSUIPC4 options, one of those axes will have already been detected as moving and will therefore already be displayed.

Here, the Joystick number is 0. FSUIPC4 handles up to 16 joystick devices, numbered 0 to 15, each with up to 12 “axes”. The possible axis identifications are X, Y, Z, R, U, V, S, T, P, Q, M and N. The first six (XYZRUV) are the original non-DirectInput axes FSUIPC has long supported, whilst S and T are Sliders, and P, Q, M and N are all “Point-of-View” (POV) controllers which cannot be used like genuine analogue axes.

supported, whilst S and T are Sliders, and P, Q, M and N are all “Point-of-View” (POV) controllers which cannot be used like genuine analogue axes.

Of these it is common for X and Y to be assigned to aileron and elevator, respectively, Z or S to throttle, R to rudder, leaving U and V for additional uses such as Mixture and Prop, or analogue toe brakes, and the inevitable POV (P) for view selection or panning.

If the displayed axis is not the one you want to set, try clicking on the “Rescan” button (top left), then moving the axis you want to set. If the wrong one comes up again it will be because that one is apparently changing more than the one you want—FSUIPC4 selects the one with the greatest changes. To get over that you can choose, temporarily, to ignore the axis that is interfering with your efforts. To do this, click on the “Ignore axis” button, over there on the right. This doesn't ignore it forever, only during the scanning. You can ignore as many as you like, and clear the whole list of ignored axes by clicking on the “Clr ignores” button at any time.

The other parts of this centre part of the display are:

- **Aircraft or Profile specific checkbox:** this is where you can tell FSUIPC4 that the assignments for this axis are specific to the current aircraft or profile. If this checkbox is not checked then the assignment applies to all aircraft that do not have any of their own specific assignments and are not assigned to a profile. NOTE that this is different to the way it operates in Button and Key assignments. Your generic (non-specific) assignments do *not* apply to any aircraft for which you make specific assignments. This difference is necessary due to the active nature of axes compared to unpressed buttons or keys.

FSUIPC4 only retains one set of assignments in memory and therefore in action. This will be the general [Axes] set if the currently loaded aircraft has no specific assignments, otherwise it will be the latter. Also, the short aircraft name option (needing INI file editing) applies just as for Buttons, Keys and Calibrations.

When the aircraft/profile specific option is selected for an aircraft you are presented with an option to retain (copy) all the general ones, to work from as a basis, or to start from a clean sheet. For minor variations you will probably opt for the former, but if you have completely separate controls for, say, a Boeing and an Airbus, or a prop and a helicopter, then you might find it easier to start again for each one.

If you try to uncheck the ‘aircraft specific’ option, you will be offered the choice to delete all the specific assignments for the current aircraft. If you decline, then the aircraft specific setting remains. This is a cleaner way of removing aircraft

settings than deleting the section in the INI file. However, it cannot be used for Profiles – you’d have to manually remove the aircraft from the relevant Profile list in the INI.

At various stages you may be given the option to save any changes made so far. If you don’t do this then axis assignment changes since entering the Options system may be lost.

- Raw checkbox: this is rather technical, so skip this explanation if you like and come back later. For now leave it unchecked.

FSUIPC4 now use DirectX. This provides two ways to read joystick axis values—‘raw’ and ‘calibrated’. In Raw mode, none of the calibration performed in “Game Controllers” is applied. The value passed through to the program is the actual value read from the device (or rather its driver).

FSUIPC can use either. Whilst you will usually find that raw values are more honest in showing the true resolution of your device, you need to consider their end use. Where calibrated values will seem to vary enormously between large numbers like –32767 and +32767, the raw values are often just 0 to 255, or even 0 to 127. There are some higher resolution devices about which provide larger ranges, but not many. The main exception is the EPIC card which can, via its “soft” (programmed) axis facilities provide full 16 bit values.

When FSUIPC is asked to apply RAW input to a normal analogue control, it scales it by a factor of 256 or 512 to bring it up from its 7 or 8 bit range to a full 16 bit value. However, a problem can then arise. Many USB devices, especially those which come with their own specific drivers, supply values in the higher ranges even though their true resolution is really no more than those with the smaller numbers. Whether it is the hardware or the software which is doing this pre-scaling is unclear, and it probably varies in any case.

Unless you are sure (and, in fact, see) that the values from your device never exceed 255, the only real use of the Raw input facilities is when you are using an axis to set a precise value, such as a heading, altitude, speed, or even a radio frequency. For this you will almost inevitably be using a precise programmable input device, such as EPIC as previously mentioned. For all ‘normal’ analogue input needs, you should avoid “RAW” mode, so leave the setting to its default, and do a preliminary calibration in Game Controllers.

Note that, in the illustration the ‘Raw’ option is disabled (greyed out). This is because I have other axes on the same joystick already set using the normal calibrated input. This is a restriction on the way the Windows API works when polling joystick axes. All 6 axes on a specific joystick must be read in the one mode, calibrated or raw. You cannot mix the modes on a single joystick. If you need to change the Raw/Calibrated option once an axis has been assigned, you will first have to clear all axis assignments on that joystick.

- Delta value (256 here): this value is the minimum change in the axis input that will be used by FSUIPC4 to cause any event (axis or other control to FS). The idea of this is to prevent minor jitters or very small changes from resulting in a massive queue of events being sent to FS for its attention. In the main, calibrated axis resolutions are much lower than folks may imagine—possibly only 30–60 different values in reality for the average hardware device. And the resolution of FS’s reaction to different values is not designed to be that much better, for the obvious reason is that it need not be, with such low resolution inputs. Therefore, bombarding FS with many changes that make absolutely no difference is a waste of processing time.

Except for the POVs, FSUIPC4 sets a default Delta value of 256 for calibrated input, but only 1 for Raw input—the latter on the basis that often the reason for the choice of ‘raw’ in the first place is to set a specific exact value. It is in your interest to set the highest Delta value that still gives you all the sensitivity and resolution you need. To change the Delta, click the Delta button, move the joystick lever the minimum fraction you want to detect, then press the button again. If you don’t press it again within a few seconds, the delta value will be set to whatever change it has seen in that time, so take care.

POV axes (i.e. those designated as P, Q, M or N) have an assumed Delta value of zero, and this is not user adjustable. This means that they auto-repeat even when providing the same value. The repetition rate is throttled to around 18 per second, even if the Button polling rate has been set faster.

The main benefit of this is that you can assign a POV to the “PAN VIEW” FS control, and, in Virtual Cockpit mode, get very close to the same smoothness and panning rate this gives when assigned in FSX itself, thus making the axis assignments in FSUIPC4 a complete alternative to assigning in FSX.

- The IN and OUT values here show the actual input value from the joystick (“IN”) and the value actually used after the Delta change check has been applied (“OUT”). With the default Delta value the IN and OUT values will almost always be the same. Only if you set the Delta to a value greater than the resolution of the axis will you often see differences.

Okay. Now let’s progress to the main points of this section: the actual assignments. You will see immediately that there are two halves for this. The left half deals with the normal assignment of axis controls to the currently selected axis. We’ll deal with that first, as it is the one you’ll be using most. The right half allows you do send button or switch type controls (even keypresses using an FSUIPC4 control for this) when certain parts of the axis range are entered, exited or passed through. And, although they look like two discrete parts, you can actually program the one axis to do both types of things.

First, then, the axis control assignment:

First, note that there are *three* ways you can assign axis controls. The normal (and default) method is to assign them to the available FS axis (or analogue parameter) controls. This is the “Send to FS as normal axis” selection. The drop down list contains not only all of those controls which FS’s own axis assignments provide, but all those which FSUIPC4 knows about too—including, for example, the older ‘THROTTLEn SET’ controls which FSUIPC4 uses to provide reverse thrust zones on the same axis. Added to FS’s internal list are those FSUIPC4-specific controls which can take parameters, like Autobrake Set, though some of these would really need the Raw input setting to be of use (on this side of the dialogue anyway).

In the illustration you will see that you can assign up to four different controls to the one axis. You enable each of the four by checking it to the left. This provides full flexibility for “mapping” your levers to selected engines and so on. Together with the aircraft specific option and the automatic loading of the correct settings (and calibrations, if you calibrate in FSUIPC), you have the utmost flexibility. In this example I’ve assigned an axis to the throttles for engines 1 and 4, the outer two on a four-engined aircraft. I would likewise assign another lever to control the throttles of engines 2 and 3, the inner engines. Such variations are possible here, which just aren’t easily supported elsewhere.

Turning to the other assignment method, the one labelled “Send direct to FSUIPC calibration” actually bypasses FS altogether until the axis input has been through FSUIPC4’s own Joystick Calibration section. In this case the drop-down shows only those controls which can be calibrated in FSUIPC4, but this includes some which you would otherwise have to assign special numbers to in FSUIPC4.INI as described in the Advanced User’s guide. For example these include Aileron Trim, Rudder Trim, and the four Cowl Flaps controls. (Part of the drop-down list for this option is shown in the illustration to the right).

Among the special controls there are three “combination” controls, which allow one axis to be treated differently depending upon FS’s mode. These are:

- | | |
|-------------------------|--|
| Aileron/SlewSide | controlling ailerons in flight mode, lateral slewing in Slew mode |
| Elev/SlewAhead | controlling elevator in flight mode, longitudinal slewing in Slew mode |
| Rudder/SlewHdg | controlling rudder in flight mode, yaw slewing in Slew mode |
| Throttle/SlewAlt | controlling throttle in flight mode, vertical slewing in Slew mode |

Whichever you choose, you can still use the FSUIPC calibration section as normal—in fact you *have* to in the case of the “direct to FSUIPC” controls. In other words these all need selecting and calibrating in the Joystick Calibrations section, which Flight Mode settings set and calibrated in flight mode, and the Slew mode settings in slew mode.

NOTE, however, that using the Direct to FSUIPC option will make the selected axis controls bypass any advanced cockpit panel coding you may be using. Try things first, and if they do not work with your panel you will probably need to revert to the normal methods.

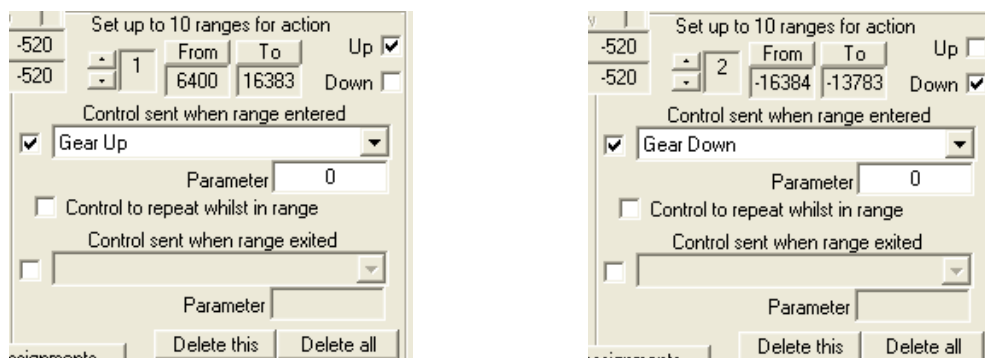
ALSO NOTE that for those of you with multiple controls (e.g. for pilot/co-pilot) there is one special advantage in assigning axes “direct to FSUIPC calibration”. As well as being able to assign several different axes to the *same* FSUIPC controls, FSUIPC will actually arbitrate between them, the maximum value (away from zero) being the one which “wins”. This arbitration only takes place when an axis is moved, however.

Finally, the third option, “Send to FSUIPC Offset” is a much-less used facility to allow axis values to be sent direct to FSUIPC offsets. This is by assignment to one of five Offset controls -- Byte (8-bit), Word (16-bit), Dword (32-bit) Float32 (32-bit floating point) or Float64 (“double” floating point, 64-bit). Up to two offsets can be selected, with different Offset controls. Note that with the Byte assignment, any value exceeding the 8 bit capacity will be simply truncated, only the lower 8 bits surviving.

Care must be taken using this facility not to overwrite critical offsets. Normally the offsets chosen will be one of the user-assigned batch (66C0 - 66FF) or some specifically assigned to an FSUIPC application program. There are no ordinary user reasons for selecting this option.

To change between the three methods you will have to de-assign the axis controls first. Do this by removing the check mark to the left of each assignment.

Now, let's look at the rather more complex right-hand side of the Axis assignments section. Here are two pictures that I'll explain, as examples:



In this section you can set up two 10 zones (ranges of values) on the current axis that will each, separately, trigger a control. The controls are any of the button/switch controls that you can assign in FSUIPC4's button section—all are listed in the drop down according to the same rules as on the Buttons + Switches tab. Those controls which take a parameter can do so here, and you can enter an offset too for the FSUIPC4 offset controls. Everything is exactly comparable to assigning buttons, except that the trigger is related to the values arriving from the axis.

First you set the range of values in which this action will occur. The little spin control on the left selects which of the 10 ranges you are now setting (you can go back and change or adjust them using that spin control). Then you simply move the lever to the two extremes of the range, clicking the "From" button at one end (the lower number) and "To" at the other (the higher number). If you get these the wrong way round, no matter—FSUIPC4 will still understand. The values should be different, though.

The check boxes 'Up' and 'Down' allow you to select whether the action is to occur when the axis is moving from low values to higher ones ("Up"), or the other way ("Down"), or both. This allows you do have different things happen one way than the other.

You can assign one control to be sent when the specified zone is entered, and a separate one to be sent when the specified zone is exited—both or either, your choice. Check the box to the left of the relevant drop-down to enable it.

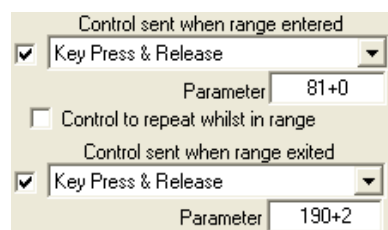
In the example above, I have programmed a joystick lever to operate the Gear. When the lever is pushed away/up, into the higher range (6400 to 16383) I get a Gear Up, when it is pulled to me/down, into the lower range (–16384 to –13783) I get a Gear Down.

Other points to note here are:

- You can have the "entry" control repeat, at about 10 or so per second, whilst the axis remains within the range—just check the "control to repeat ..." option.
- To delete any one of the 10 separate ranges assigned here, just find it and use the "Delete This" button. To delete all the ranges (but leave any axis assignments on the left-hand side) use the "Delete All" button.
- The "Clear" button at the top left of the page clears all axis assignments for the current axis, both left and right.

Finally, one final question should occur to you: in the Buttons+Switches section you can assign FS controls or Key Presses. The Key Press assignments come in useful for those add-on aircraft panels which don't provide controls for everything. Suppose I want to send keypresses based on an axis position?

This *is* possible using added FSUIPC controls to send Key Presses. Scroll down the drop down list of controls and you will see the three options: Key Press and Release, Key Press/Hold, and Key Release. These take a parameter that defines the key press to be used. Here's a rather unlikely fictitious example:



When my selected axis zone is entered, I am sending Key Press 81+0. Here the '81' is a KeyCode and '0' are the Shift keys I need. KeyCodes are listed in the Advanced User's guide—81 is 'Q'. The shift key combinations you can have are also listed in that document. Here I just want a plain Q (for FS's sound toggle—for which I should really have used an FS control of course), and I could use '8' or '0' for that.

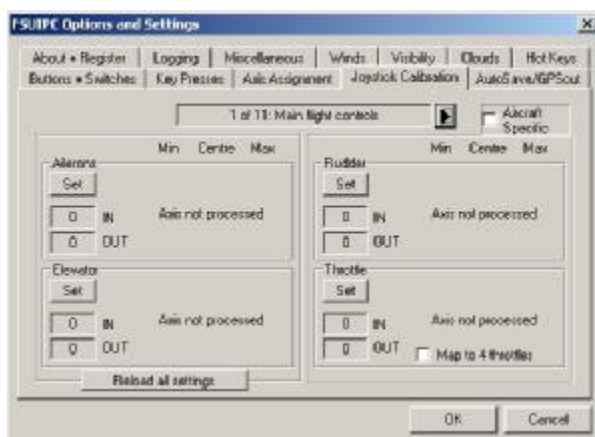
When the zone is exited I am sending 190+2. The 190 Key code is the .> key, the one normally allocated in FS to brakes. The +2 sets the Control shift, so this is "Ctrl+.", which will operate the parking brake toggle by default.

In both cases I would be better off using an FS control from the drop-down, but with an add-on panel, or FSUIPC's own Hot Keys, or even an external program looking for a hot key, you can see that the key press control will be useful.

Joystick Calibration

The calibration of joysticks has always been a difficulty with Flight Simulator. There are calibrations you can perform in the Control Panel (in the “Game Controllers” applet), and in Flight Simulator itself you can set sensitivities and “null” or “dead” zones. These are all very well, but the results have always seemed to me less than precise. And getting and keeping accurate centring on the axes that need it is often a pain. So I added facilities for final “tuning” of joystick controls, once they’ve been through FS’s assignments and main calibration.

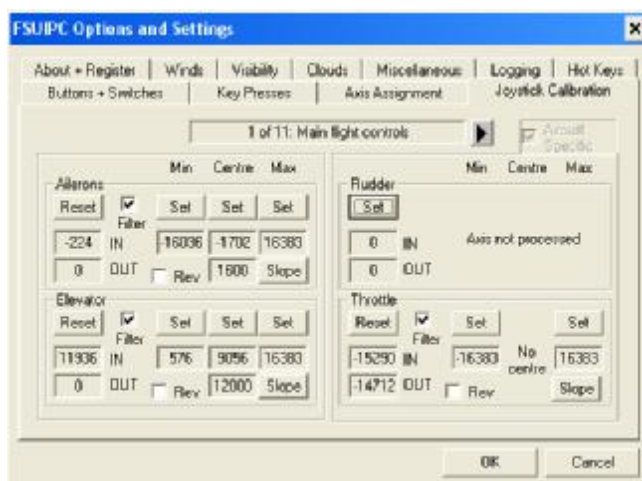
Selecting the “Joystick Calibration” tab in the FSUIPC4 options you will see something similar to this:



FSUIPC4 does not interfere with any joystick axis at all by default. You have to set an axis in one of the Joystick pages first. In this picture only the Throttle is shown not selected, so three of the four axes included on this page will be handled by FSUIPC4.

The numbers for IN and OUT under the left-hand Set/Reset buttons are actual values arriving at FS’s simulation control in real time, as you move the controls. When FSUIPC4 is not processing an axis, the OUT value will be the same as the IN value, otherwise it will show the results of FSUIPC4’s processing. For those axes where FSUIPC4 is supplying a function not actually provided in FS (as in the case of the Reverser axis), you normally won’t see any values unless you elect to process it by pressing the ‘Set’ button—pressing ‘Set’ changes it to ‘Reset’ and this indicates that FSUIPC4 is doing something with that axis.

When you set an axis by pressing ‘Set’, two or three new “Set” buttons for the axis become available and the main one becomes the “Reset” button (used then to stop FSUIPC4’s processing), so, as an example, page 1 with some things being calibrated may look like this (*Note that this picture is actually from FSUIPC3, but it illustrates the subject identically*):



The numbers shown under the ‘Set’ buttons are those which will be used to scale the inputs, stretching or compressing them to fit the specific needs of the control, and also to set dead or null zones. You don’t need to worry about the numbers particularly, as you will calibrate by simply moving the axis and clicking the buttons.

The default settings which first appear when you set an axis give full range (no scaling) appropriate to the axis type, with no limit dead zones and only a nominal (about 3%) central dead zone where this is applicable.

Unless you are using FSUIPC4's Axis Assignment and other facilities for complete control of your joystick inputs, then before starting to use FSUIPC4 for joystick handling, there are two things it is useful to do, to get maximum benefit:

- (1) Go to the FS joystick options and make sure you have the **sensitivity** at maximum and the **null zone** at minimum. Any other setting will reduce the range of your joystick and make FSUIPC4's more accurate calibration less effective.
- (2) For more predictable responses from your joystick, consider editing the FS CFG file and adding:

```
STICK_SENSITIVITY_MODE=0
```

To the [CONTROLS] section. This makes FS treat the raw joystick readings in a linear fashion. By default, since FS2000, FS has applied a time-change formula to the axes that, in my opinion at least, can give rise to some unwanted behaviour. You will need to edit the CFG file *before* running FS, as any changes you make whilst FS is running will be overwritten.
[Note that this is actually still applicable in FSX]

Of course, if you are using FSUIPC4 for everything to do with joysticks, be sure instead to disable the joystick input in FS's own Options-Controls menu). You won't want to do this if you are using a Force Feedback device, unless you don't like that option, as FSUIPC4 does not use DirectX and does not support Force Feedback.

Note for PFC throttle quadrant users:

If you are using a PFC throttle quadrant, with my PFCFSX driver for FS, then it provides a facility to suppress "Game Port" throttles so that they do not interfere with its own. This actually refers to any Windows-recognised throttles, so it will apply to USB ones too.

If you use that facility you will see the comment "but using PFC" against the affected axes in the FSUIPC calibration pages. Normally you are expected to use the assignment and calibration facilities in the PFC driver, but if you have alternative throttle devices for specific aircraft you may want to override the PFC setting just for those aircraft. To do this you need to edit the FSUIPC4.INI file. Find the relevant [JoystickCalibration ...] section for the aircraft (assuming you are making aircraft or profile-specific assignments) and add this line:

AllowSuppressForPFCQuad=No

You should also consider preventing interference from the PFC throttles by assigning a blank user configuration for the same aircraft, though this shouldn't be necessary if you park the PFC throttles in a non-jittery opposition.

IMPORTANT: Throttles for Wilco Airbus users (and possibly other Airbus add-ons)

Normally, the 4-Throttles calibrations result in an output with either a range which includes the reverse zone, or, if the "no reverse zone" option is checked, a range from 0 (idle) to 16383 (max). These are sent to FS using the older THROTTLEn_SET controls, since these are the ones providing the reverse zone below zero.

The Wilco Airbus add-ons, however, appear to only like seeing the more modern AXIS_THROTTLEn_SET controls, which have no reverse zone, running from -16384 idle to +16383 full thrust.

Therefore you need to take special precautions when calibrating throttles for these aircraft.. First you need to edit the FSUIPC4.INI file. Add this line (or change it) in the [JoystickCalibration] section applicable to your Wilco Airbus aircraft:

UseAxisControlsForNRZ=Yes

This will be Aircraft or Profile-specific if you set it in the appropriate calibration section of the INI file.

Then check the "NRZ" ("No reverse zone") box on the 4 throttles calibration tab in FSUIPC options. If you've already calibrated you should now re-calibrate because the values used will be different.

THE EASY STEP-by-STEP WAY TO CALIBRATE YOUR CONTROLS

To calibrate any axis, just do this:

1. For most axes, you need to be in normal flight mode (i.e. not **Slew**). However, if you wish to calibrate your joystick for slow movements, you *must* enter slow mode (e.g. press Y) before entering the FSUIPC4 options. FSUIPC4 like FS itself only sees slow axes when in slow mode, and only sees normal flight axes when not in slow mode.
2. Move the control for this axis and verify that the values for IN and OUT are changing. If they aren't, then you've either got the wrong control or your configuration is wrong (in FS's CFG file or its Options-Controls-Assignments).
3. Set the axis, to obtain the individual set buttons, if these aren't already showing. Do this by pressing the Set button on the left, turning it into the 'Reset' button.
4. Move the control in either direction and verify that the value is changing up or down as you'd expect. Aileron and rudder controls increase (more positive numbers) when turned left (=MAX), decrease (more negative numbers) when turned right (=MIN). Elevator controls increase when pushed (nose down) (=MAX), decrease when pulled (nose up) (=MIN). All others are pretty logical—more is higher, less is lower. If your axis is changing in the wrong direction you will need reverse the axis, either in FS itself, or here in FSUIPC4 (see the little 'Rev' checkbox?).
5. Now move the control to its lowest (right-most/rear-most) position. If you want a dead area, relax it the amount you want to stay fixed, then press the "Set" button in the "min" column (for 'minimum'). The currently read value is recorded in the box below the button.
6. For controls which have centres or intermediate 'idle' positions (aileron, elevator, rudder, spoiler, trim *and* the separate throttle and propeller pitch controls where centre (idle) is between forward and reverse), position the control in its centre, détente (e.g. "arm" for spoiler) or default position. Pressing the centre "Set" button will enter the value in one or other of the two boxes beneath. Each time you press Set the alternate value is recorded, and the boxes show the two most recent values in order (lower above higher). If the values are the same you will have no dead zone around the centre.

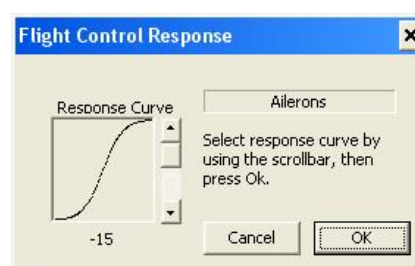
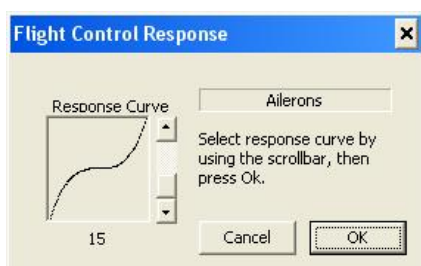
[Note that the Flaps control uses the "centre" calibration mechanism to set positions for every flap détente—please refer to the separate section, later, for the way to deal with flap levers with détentes for specific settings]

If you want to be able to simply take your hands and feet off the controls and expect them to centre well automatically, you will almost certainly need a central dead zone. You will also need one on a throttle or other control with a reverse range, otherwise finding idle will certainly be a problem.

You can *either*:

- simply push/pull/swivel the controls in different directions and let go, so that they centre with their normal variation, and press the centre Set for the two most extreme values you get for the supposedly centred control, *or*
 - more precisely, and the only way with throttles and other levers, move the control one way a little, press the centre Set, then the other way a little, and press Set again. This way you get to choose the size of the dead zone with more precision.
7. Move the control to its highest (left-most/forward-most) position. Again, if you want a dead area relax it an appropriate amount, then press the Set button in the "max" column.
 8. You can select a response curve ("**slope**"). There are 31 different slopes to choose from, ranging in one direction from linear (default) to one with a very flat centre (for reduced sensitivity—i.e. more control movement needed for same effect) and steep ends to reach the maximum deflections, and in the other direction to the reverse extreme: steep centres and flat extremes.

To select the slope desired, press the **Slope** button. You will see a window like these:



Here the one on the left is slope 15, the one with the flattest centre response (i.e. more stick movement, less effect) and steepest extremes, and the one on the right is slope -15 which is the other extreme, a very steep and therefore over-sensitive centre, and flat extremes. A flat response, the default, is slope 0.

For axes with no centres you only get to right-hand part of the slope, but the same variety is available. For axes with “off-centred” centres, such as the separate throttles with a small reverse zone below an off-centred idle position, the left hand part is kept linear in order to be sure that the very extreme left position can be reached. The slope changes apply only to the right-hand or positive part of the lever movement.

Just move the slider in the scroll bar down to the position for the sort of response you’d like. Press OK when you are happy, or Cancel to leave it as it was. Note that the response curves are only applied when the axes are calibrated in FSUIPC4, though the slope settings are remembered anyway, even if no calibration is set.

9. There are two other options you may be wondering about. **Filter** allows you to switch on a simple digital filter for the axis. This tries to suppress fast changes such as jitter. Because it is kept simple (for performance reasons) it isn’t perfect, but if you do suffer from jitter on an axis, try enabling it. It won’t do any harm and it may help. *[Note that enabling the filter action on some axes, particularly Brakes, can apparently adversely affect the way some advanced cockpits operate. If you have any doubt do **not** check the Filter option].*
10. The other option is **Rev**. If you check that, FSUIPC4 reverses the axis completely, just before supplying the calibrated value to FS. All the calibrations and so on are done exactly as above—if you select Reverse you will simply see the Output value change. This option is provided for the few cases where the FS option for axis reversal doesn’t appear to work, or doesn’t apply in any case.
11. On the four throttles page there is an option (top left) to calibrate the separate throttles with no reverse thrust zone. Check this if you are fusing an aircraft without reverse, or if you are either using separate reverser levers, or engaging reverse via button operation.

Similar options are provided on the 4 Propeller Pitch page and the 4 Mixtures page. The three options operate independently of each other.
12. On the four throttles page there is an option (lower centre) to exclude THROTTLEn_SET axis controls. This is provided to handle a specific problem when calibrating the throttles in some advanced add-on aircraft, and it is enabled by default . Only disable this option if you have anything which is feeding FS the older FS2000 and FS98 controls which you need calibrating or otherwise directing.

Similar options are provided on the 4 Propeller Pitch page and the 4 Mixtures page.
13. The "Sync Pos" button on the 4Throttles, 4 Prop Pitch and 4 Mixture pages invokes a special calibration facility designed to allow multiple levers to line up correctly for the same input to FS. This subject is dealt with in its own section, below.
14. That’s it. Do this for each axis you feel needs it. Scroll through the 6 pages of Joystick axis settings and choose the ones you have connected. Note that, in *all* cases, calibration values increase left-to-right. That is, the boxes under the assorted “Set” buttons used in calibration can only be set such that the value in the right-hand one (“Max” usually) is greater than that in the left-hand one (“Min” perhaps), and the centre pair, if any, are in between these extremes.

NOTES and EXCEPTIONS

There are several special cases you may want to deal with:

- If you have a single brake lever or pedal assigned to “BRAKES” in FS’s CFG file, be sure to use that single axis to calibrate *both* the left and right brake exactly the same (right-hand side of page 2 of 6), otherwise every time you brake you will swerve to one side.
- If you have a single throttle control and you’d like to have an idle and reverse zone on this, then in the throttle part of page 1 select the “Map to 4 throttles” option. Then turn to page 3 of 6 and calibrate your throttle using the throttle 1 axis. The other three will match exactly. Choose the minimum (full reverse) and maximum (full forward) in the usual way, but make a centre ‘idle’ zone wherever you want it on your lever’s movement—close to a détente or other stop if you have one.
- Similarly, you can use a single propeller pitch control lever to provide reverse pitch control (useful on the KingAir, for example). In the prop pitch section on page 2 of 6 select the “Map to 4 props” option, then turn to page 5 of 6 and calibrate your propeller control using the prop pitch 1 axis. The other three will match exactly. Choose the minimum (full reverse) and maximum (full forward) in the usual way, but then make a centre ‘idle’ zone wherever you want it on your lever’s movement—close to a détente or other stop if you have one.
- Again, you can use a single mixture (or ‘condition’) control lever to provide a specific idle zone above the full cut-off minimum position—also useful on the KingAir. In the mixture section on page 2 of 6 select the “Map to 4 mixt” option,

then turn to page 4 of 6 and calibrate your mixture/condition control using the mixture 1 axis. The other three will match exactly. Choose the minimum (cut-off) and maximum (full rich) in the usual way, but then make a centre ‘idle’ zone wherever you want it on your lever’s movement—close to a détente or other stop if you have one.

- If you have twin throttle levers and you’d like to control left wing engines and right wing engines separately on both 2 and 4-engined places, then make sure both throttles are operating correctly with twin planes then go to the third page of the Joystick controls in FSUIPC, the one showing 4 throttles. Calibrate throttles 1 and 2 then check the option “Map 1->12, 2->34”. This will do the job. The mapping only occurs when a 4-engined aircraft is loaded. This facility also applies to the mixture and propeller pitch levers.
- A similar facility is available for flying 3-engined aircraft with two levers. In this case the first lever controls both engines 1 and 2, and the second one controls engine 3. Follow the same calibrations as in the previous instance, but then check the option “Map 1->12, 2->3”. This mapping only occurs when a 3-engined aircraft is loaded. This facility also applies to the mixture and propeller pitch levers.

IMPORTANT: If you have more than one throttle, and calibrate them separately on Page 3 of the FSUIPC4 Joystick options, you need to take care with any aircraft panels equipped with an “Engine Control Unit” (ECU) or “Electronic Engine Control” (EEC). The aircraft panels equipped with these are altering the values you send from your throttles in order to keep the engine within set bounds. But they do this by sending the same controls as your real throttles, so FSUIPC4 applies calibration to those as well as yours. If you calibrate with the idle position well below centre (i.e. negative), which is quite likely, as you will want to use a smaller portion of the travel for reverse than for forward thrust, then the “idle” value of 0 sent by the panel will equate to some positive forward thrust.

There is no easy answer to this. You will either have to calibrate taking care to keep the idle area centred on the value 0, or disable the Engine Control Unit in the panel.

- FS does not operate its “elevator trim” facilities on the pitch control of helicopter models. If you want a pitch trim control for these, FSUIPC4 can provide it for you. You must calibrate the elevator axis itself (i.e. the Y axis of the cyclic) in FSUIPC4, and edit the FSUIPC4.INI file, adding ‘**ApplyHeloTrim=Yes**’ to the appropriate [JoystickCalibration ...] section in the FSUIPC4.INI file. FSUIPC4 will then apply both FS elevator trim inc/dec and axis controls to the aircraft’s pitch axis. For more details see the **ApplyHeloTrim** parameter in the Advanced User’s document.
- Similar considerations apply to the trimming of bank control on helicopter models. This can be handled, using FS’s aileron trim, in addition to the pitch trim by calibrating the aileron via FSUIPC4 and setting the **ApplyHeloTrim** parameter to **Both** instead of **Yes**. Again, for more details see the Advanced User’s document.
- The Spoiler (speed brake) control is a little special. It has no “centre” as such, but the facilities for setting a centre in FSUIPC4 are used to calibrate a zone on your lever in which the spoiler should be “armed”. You don’t need to do this, it is options: if the two centre calibration values are the same (i.e. there is no centre “zone”), then there is no arming action taken by FSUIPC4. If, however, you do calibrate with a centre zone, then the values from “minimum” (the left most value), or lower, up to the lowest of the Centre values will all select spoilers down (i.e. parked). The centre zone will arm the spoilers, and the range from the higher of the two centre values up to the maximum (the right-most value) will actually operate the full range from 0% to 100% deployed.

Note that if you arm the spoilers when on the ground, FS will deploy them to 100%, as if you have just touched down. However, they should return to the “armed” position when the throttles are advanced.

- The Flaps axis control can be calibrated simply, just like the other axes. If the simple approach is taken then FSUIPC4 will compute zones along the calibrated range for selection of each of the flap settings available with the current aircraft. However, for those of you who are building a flaps lever with détentes for the flap selections specific to your chosen aircraft, facilities exist to calibrate the axis values to match your détentes precisely. This is described in the following section.

CALIBRATING MULTIPLE THROTTLE, PROP & MIXTURE AXES TO "LINE UP"

The 4 throttle, 4 prop pitch and 4 mixtures pages all feature a button, centre bottom of the display, labelled **"Sync Pos"**. This is used to help you calibrate multiple axes, for 2-4 engines, so that they are close to lining up, in similar positions, when providing the same input values (thrust or whatever) to Flight Sim. This is the procedure to follow when you want to do this:

1. Before starting on this process, first make sure you set whatever options you need. Choose the "no reverse zone" option before doing anything if this is what you want, and also the "Rev" options where needed to alter direction. The Slope and Filter facilities shouldn't be used.
2. Calibrate the first axis (for Engine #1) following the correct procedures as outlined above. It is important to get this right first. Calibrate the others too—but try to set the minimum, maximum (and centre if used) values such that the levers all line up at each of those two (or four) places. This gets you half way there already.
3. Now, line up all the levers in several intermediate places—especially those where you know they didn't give equal outputs before. For each lined up position, press the **"Sync Pos"** button. The positions of all the calibrated levers will be remembered. Do at least 4 such positions, spread over the lever range (between your minimum and maximum calibrations). The more positions you do, the smoother will be the calibration between each. FSUIPC will record up to 63 such positions, but will overwrite close ones with later settings. You will never need that many!
4. You don't need to set a large number of positions all in one go. Do a few, then OK out of the options and check the results. Bring up the quadrant levers display in FS so you can see how you are doing. If you need to do more, go back and simply use the **Sync Pos** button again. FSUIPC will ask you if you want to replace the settings you already did. If you think you ought to start again, say Yes. Else your new settings will be added to the previous ones, or replace them when very close.

For axes which have had a Synchronisation list made in this way, the "Slope" option does not apply. Instead, pressing the Slope button will show you the 'curve' representing how your sync pos recording has affected how the calibration will be performed. You cannot amend this there, but if you want to delete this feature for any of these axes, you can do so there. Bear in mind that if you do delete it there, then OK out of the Options, you will lose those settings forever. But if you are simply experimenting and want to go back to normal calibration, that's the way to do it—easier than editing the INI file.

The synchronisation positions are saved in the INI file, in the specific [JoystickCalibration] section currently applicable (eg. specific for the aircraft or profile when this is applied), in lines beginning "SyncSlope...". The numbers shown in pairs represent the x and y positions, respectively, of the (up to 63) points on the "slope" being used to calibrate the named axis.

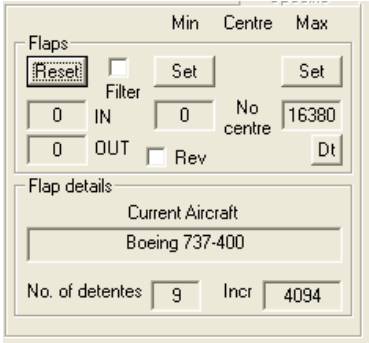
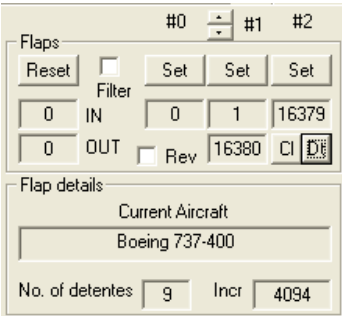
CALIBRATING FLAPS WITH SPECIFIC DÉTENTES

If you have a flaps lever with detentes (fixed places for specific flap settings), then you can calibrate the axis specifically so that the region of those detentes calibrates exactly to the desired flap setting. Your calibration is then specifically suited to that particular range of flaps settings.

Do not even entertain the idea of doing this for an ordinary free-moving flaps lever. It simply isn't worth it—you'll have more difficulty selecting the correct flaps than by simply making small movements and observing the gauge.

If you really wish to proceed, go to page 6 in the Joystick Calibration tab, the one with the Flaps details shown. After pressing the "Set" button, to indicate you want to calibrate the flaps, you will see something like this (the 737 is loaded here):

As it stands you can go ahead and calibrate the flaps axis just like any other. The secret for setting specific détente zones is all behind the button labelled "Dt", for Détentes. It's a toggle. Click on it once and you'll see changes, as shown in the second picture, below:



There are now two ‘centre’ values showing, a “Cl” button (for Clear), and the column headings showing #0 #1 and #2, with a little spin control next to the centre #1. Note that the spin control and the #1 are above the two newly appeared centre values. **THIS IS IMPORTANT!**

The left heading number (#0) indicates that the ‘Minimum’ (left-most) calibration is the limit for 0 flaps—that is no flaps, or flaps completely up. The zone for this no flap setting goes from –16384 up to the value calibrated in this column. You set this value by using the leftmost of the three Set buttons, and the value calibrated here remains set for Flaps 0.

The right heading number (#2 at present) is the highest flap number so far entered—because we must have a ‘flaps down’ and a ‘full flaps’, and at least one ‘centre’ (intermediate) flap value. Thus, the initial default is for flaps #0, #1 and #2. Note that these are flap numbers, always sequential, not flap angles!

The process to calibrate your détentes is as follows:

1. Set the flaps lever to a position a bit inside the Flaps Up position/notch (i.e. towards your Flap #1), and make this the minimum (i.e. click the left-hand ‘Set’). The zone for Flaps 0 is now set. You don’t change the minimum again (unless you need to adjust Flaps 0 zone on the axis).
2. Set the lever to a position a bit before the Flaps Full position/notch (i.e. at the other end, but not quite ‘full’), and make this the maximum (i.e. click the right-hand ‘Set’). The zone for Flaps Full (currently #2, but that will change as we add more détentes) is now set. You don’t change the maximum again (unless you need to adjust the Flaps Full zone on the axis).

So far it has been like a normal axis calibration. In fact, if you’d already calibrated the axis in this way before selecting ‘Dt’, the correct values would likely have already been set in Min and Max. All that now remains to do is set all the intermediate positions, to match zones around your own lever’s détentes or notches.

ALL this is done in the centre column, alone.

The first flap to calibrate is #1. Use the spin control up and down keys (near top centre) to select flap #1 if #1 isn’t already shown there.

3. Move the lever to just before the first flap down position/détente, i.e. close to the Flaps #0 zone, but above it. Then click the centre Set button. The value will record as one of the centre column values, and defines one end of the zone that will be considered setting Flap #1.
4. Move the lever to just after the same flap notch, and click the centre Set again. This second, higher, value will become the second centre column value.

Congratulations, you have just defined the zone for Flap #1. The centre column heading is still #1, showing this as the selected flap number.

5. Now use the little spin control (top arrow) to increment the centre flap number (the one just to the right of the spin control) to the next value.

Note that flap numbers can only be increased until the TOTAL number of flaps détentes recorded is the same as the number for the currently loaded aircraft (as shown in the Joysticks section below the flaps calibration section). So, for a 737, the headings end up as #0, #7, #8 (for a total of 9 positions 0–8).

6. Move the lever to just before the next flap position/détente. Then click the centre Set button. The value will record as one of the centre column values, defining one end of the zone which will be considered setting the selected Flap number.
7. Move the lever to just after the same flap notch, and click the centre Set again. This second, higher, value will become the second centre column value. And that’s the next détente zone defined.

Here’s an example for a 737 fully set with the 9 needed positions (7 ‘centre’ values, plus the minimum #0 and maximum #8). Here I’ve actually been reviewing the settings, and although all 9 are set (as shown by the #8 as the right column heading), I’m looking at the range for #5:

		#0	#5	#8
Flaps				
Reset	<input type="checkbox"/>	Set	Set	Set
Filter				
0	IN	-15108	-5355	444
0	OUT	<input type="checkbox"/>	Rev: -4271	Cl Dt
Flap details				
Current Aircraft				
Boeing 737-400				
No. of detentes 9 Incr 4094				

8. Repeat steps 5 to 7 until all the intermediate détentes are set—ALL with two values, all showing in the centre column when the relevant flaps number is shown above, next to the spin control.

That's it. If you make a mess, just press the 'Cl' button ("Clear") and start again. The values can be reviewed and re-adjusted at any time, individually (that's why the spin control can go up or down), but take care not to have overlapping zones else things may go a little odd. If you hear a 'ding' when pressing a Set then you have a value out of order. That is a no-no. They must all increase, left to right, flaps #0 to flaps #n.

All the détente calibration values are maintained independently of the simpler, analogue, calibration values. Pressing the 'Dt' button will swap between the two methods. You don't lose any détente numbers unless you press "Cl" to Clear them.

When you press Ok, the values are saved in the INI. For example:

```
FlapStarts=-16384,-16219,-15450,-12975,-6980,-573,4606,15600,16217
```

```
FlapEnds=-16256,-16200,-15417,-12950,-6950,-550,4644,15650,16384
```

The -16384 and +16384 extremes are fixed—you can change them in the INI but you really shouldn't, and there is no need to.

The 'Dt' button toggles this parameter:

```
FlapDetents=Yes
```

If this is 'No' the détentes are still loaded, just not active.

Of course, as with all things in the Joystick Calibration, Buttons and Keys sections, you can have different sets for different aircraft. Otherwise the détentes you specify will be applied as well as possible to an aircraft with a different number of flap positions ... hmmm. <G>

DETAILS OF FS's AXIS CONTROLS

Each axis that you can assign and calibrate is known to FS by a control name. Here are the names and brief descriptions of those that can currently be handled by FSUIPC4:

Axis name in FS cfg file	Function	Notes
AXIS_AILERONS_SET	Joystick/yoke ailerons, also known as 'X' axis	Values used in FS run from –16384 (extreme right) to +16384 (extreme left), with 0 as centre
AXIS_ELEV_TRIM_SET	Elevator trim adjustment	–16384 to +16384, with 0 neutral trim
AXIS_ELEVATOR_SET	Joystick/yoke elevator, also known as 'Y' axis	–16384 (pull back/nose up) to +16384 (push forward/nose down), with 0 as centre
AXIS_MIXTURE_SET	Fuel mixture control	–16384 (lean) to +16384 (rich), but see also MIXTURE_SET below
AXIS_PROPELLER_SET	Propeller pitch control	–16384 (feathered) to +16384 (full), with no reverse. See also PROP_PITCH_SET below. FSUIPC allows you to map this onto the 4 separate propeller pitch controls (PROP_PITCHn_SET) if you need reverse pitch control on the same lever.
AXIS_RUDDER_SET	Rudder input, normally from pedals but also from twist function on some joysticks. Also known as the 'R' axis	–16384 (extreme right) to +16384 (extreme left), with 0 as centre. Note that if you fly with the rudder “spike” eliminator enabled (see the Miscellaneous section, earlier), then you will probably need to first calibrate your rudder, making sure you have adequate ‘dead’ zones at either extreme. If you don't do this then attaining maximum deflection may not be possible
AXIS_SPOILER_SET	Spoiler input, allowing precise spoiler positioning for excellent descent control.	–16384 (retracted) to +16384 (fully deployed). If enabled, FSUIPC maps this control to SPOILERS_SET, so it really matters little which you choose.
AXIS_THROTTLE_SET	Throttle input, whether from a throttle level, push/pull rod, or wheel. Also known as the 'Z' axis	Running from –16384 to +16384 for idle up to full thrust, this is a single throttle which operates all selected engines (the selection being by E on the keyboard followed by 1, 2, 3 and/or 4). No reverse is normally available on this control, but FSUIPC4 allows you to map this onto the 4 separate propeller pitch controls (AXIS_THROTTLEn_SET) if you want reverse thrust control on the same lever.
AXIS_LEFT_BRAKE_SET AXIS_RIGHT_BRAKE_SET	Separate brakes normally operated by toe pressing actions on the rudders.	–16384 (off) to +16384 (full on). FSX seems to use an exponential growth function on these – a flattened initial response but steep at the fuller braking end.
AXIS_FLAPS_SET	Selection of flap setting by relative position	Flaps are set in ‘notches’ or ‘détentes’, not continuously. FSUIPC4 interprets the incoming axis value and sets the resulting output to the nearest exact notch position for the currently loaded aircraft. The range is –16384 (flaps up) to +16384 (full flaps)
MIXTURE_SET AXIS_MIXTURE_SET (FS2002/4)	Fuel mixture control	0 (lean) to +16384 (rich). If enabled, FSUIPC4 maps this control to AXIS_MIXTURE_SET, so it really matters little which you choose.
MIXTURE1_SET * MIXTURE2_SET * MIXTURE3_SET * MIXTURE4_SET * AXIS_MIXTURE1_SET (FS2002/4) AXIS_MIXTURE2_SET AXIS_MIXTURE3_SET AXIS_MIXTURE4_SET	Separate fuel mixture controls for each of up to 4 engines * These are the older ones which are normally ignored by FSUIPC's calibrations (via the Exclude option).	0 (lean or cut-off) via 8192 (idle) to +16384 (rich) Centering is provided for the 8192 value so that turbo controls with détentes on the mixture levers can be calibrated with a usable ‘dead’ zone. By default, however, this dead zone is eliminated by having both upper and lower input values for it set the same.
PROP_PITCH_SET AXIS_PROPELLER_SET (FS2002/4)	Propeller pitch control	–4096 (reverse) via 0 (feathered) to +16384 (full). But if enabled, FSUIPC4 maps this control to AXIS_PROPELLER_SET, so it really matters little

		which you choose.
PROP_PITCH1_SET * PROP_PITCH2_SET * PROP_PITCH3_SET * PROP_PITCH4_SET * AXIS_PROPELLER1_SET AXIS_PROPELLER2_SET AXIS_PROPELLER3_SET AXIS_PROPELLER4_SET	Separate fuel mixture controls for each of up to 4 engines * These are the older ones which are normally ignored by FSUIPC's calibrations (via the Exclude option).	–4096 (reverse) via 0 (feathered) to +16384 (full). All four are operated together if you map a single axis assigned to AXIS_PROPELLER_SET or PROP_PITCH_SET to these. FSUIPC4 handles these identically.
SPOILERS_SET AXIS_SPOILER_SET	Spoiler input, allowing precise spoiler positioning for excellent descent control.	0 (retracted) to +16384 (fully deployed).
THROTTLE1_SET * THROTTLE2_SET * THROTTLE3_SET * THROTTLE4_SET * AXIS_THROTTLE1_SET AXIS_THROTTLE2_SET AXIS_THROTTLE3_SET AXIS_THROTTLE4_SET	Separate throttle controls for each of up to 4 engines, with reverse thrust capability * These are the older ones which are normally ignored by FSUIPC's calibrations (via the Exclude option).	–4096 (full reverse**) via 0 (idle) to +16384 (full forward). All four are operated together if you map a single axis assigned to AXIS_THROTTLE_SET to these. FSUIPC4 handles these identically ** The actual negative value for “full reverse” is defined in the aircraft parameters (the .AIR file). FSUIPC4 calibrates reverse to match the aircraft, so you will see different values here, not just the nominal ‘–4096’.
AXIS_PAN_HEADING AXIS_PAN_PITCH AXIS_PAN_TILT	Used in FS virtual cockpit mode.	Range –16384 via neutral 0 to +16384
AXIS_SLEW_AHEAD_SET AXIS_SLEW_ALT_SET AXIS_SLEW_HEADING_SET AXIS_SLEW_SIDEWAYS_SET	Slew mode controls	Range –16384 via neutral 0 to +16384 Note that these are only used in Slew mode. FSUIPC4 cannot see them in flight mode.
COWLFLAP1_SET COWLFLAP2_SET COWLFLAP3_SET COWLFLAP4_SET	New support in FSX, but still not assignable in the FS menu	Assign via FSUIPC4 Axis assignments, calibrate in the FSUIPC4 joystick calibration pages.
RUDDER_TRIM_SET AILERON_TRIM_SET	New support in FSX, but still not assignable in the FS menu	Assign via FSUIPC4 Axis assignments, calibrate in the FSUIPC4 joystick calibration pages.

RESETTING DEFAULTS

Please note that resetting the FSUIPC4 defaults (using the buttons on the “About” page) does not change the joystick calibration system. This is deliberate, as it could be very annoying having spent a while carefully setting up the joysticks perfectly just to have them obliterated through pressing the “defaults” button once. If you want to switch any of this off, either de-select them individually (pressing the Reset button disables the FSUIPC4 axis processing actions and restores defaults), or, to do this for all at once, edit the FSUIPC4.INI file after closing FS and delete the entire section called [JoystickCalibrations].

Appendix: Axis assignment in FSUIPC4 – 10^{x2} Commandments

[This has been generously donated by Peter Hayes. Thanks Peter!]

1. There are 4 Main Options for USB controllers in FSX
 - a) Use the Control/Configuration Software Supplied by the maker of your controller
 - b) Use FSX ONLY (Windows to calibrate)
 - c) **Use FSUIPC4 only to assign and calibrate Axes**
 - d) Any mix of the above.

Option (c) – Using FSUIPC4 only!

This is for any Controller, but NOT using the supplied software* (not driver) or FSX and Windows.

1. Do NOT start CH Control Manager in mapped mode^s or use the Saitek SST software
2. Under Control Panel in Windows detect your controllers so that they are working properly.
Replug in the controllers and reboot if necessary to ensure that Windows detects the controller. (If Windows can't see it, neither can FSUIPC4 or FSX).
USB controllers are best plugged directly in to the motherboard or via a dedicated good quality powered USB 2.0 Hub.
3. If you previously assigned or calibrated in FSUIPC4 – you may want to delete (or move) the FSUIPC.ini file from the \FSX\Modules folder. Ensure FSUIPC4 is up to date and install the latest version if necessary.
4. Start FSX and go to "SETTINGS\Controls\Calibration\Controller"
UNTICK " ☐ Enable Controllers"
5. Check for and DELETE any axes assigned to the Mouse & the Keyboard
[At this point I would actually close FSX, reboot and then open FSX to make sure nothing has changed]
6. Start FSX - default aircraft stationary at any air port.
7. Press "ALT\Add-ons\FUIPC"
8. Choose "AXIS ASSIGNMENT"
9. Assign each axis for each controller (Yoke, Pedals Throttle Quadrant) as per the FSUIPC4 Manuals (User and Advanced User guides as appropriate).
You MUST follow the manual exactly to ensure that you assigned each axis correctly.
Ensure that you have no duplicate axes assigned.

10. For "Type of action" - Choose:
 "Send Direct to FSUIPC calibration".
11. Choose "Joystick Calibration" (11 tabs)
 Calibrate all axes as per the FSUIPC4 manuals
 (User and Advanced User guides)
12. Set up any Buttons & Switches and Keys at this stage
13. Check again that you have NO duplicate axis assignments
14. Click "OK" to return to FSX
15. Continue the flight: check that all axes, etc are working correctly.
 Reassign and re-calibrate if necessary;
 Re-check until satisfied and then close FSX.
16. Reboot the PC
17. Open FSX and under settings ensure "Enable controllers" is still unticked. FSX may
 reassign axes to your controllers (it will if any USB setting changes), check the
 mouse and keyboard.
18. Load the same default plane, open FSUIPC4 and check that your axis assignments
 are OK and that you are happy with your controls
19. Fly!
20. Repeat for other aircraft types as necessary and as described in the manuals.

Checklist for Assigning Axes via FSUIPC4 in FSX

- CH Control Manager or Saitek SST software not started
- Control Panel in Windows: All controllers detected and Working.
- Controllers NOT detected: Replug in the controllers and reboot if necessary to ensure that Windows detects the controller – controllers detected
- USB controllers plugged directly in to the motherboard or via a dedicated good quality powered USB 2.0 Hub.
- Delete (or move) the FSUIPC.ini file from the \FSX\Modules folder.
- FSUIPC4 is up to date and install the latest version if necessary.
- Start FSX and go to "SETTINGS\Controls\Calibration\Controller
- **UNTICK "Enable Controllers"**
- Check for and DELETE any axes assigned to the MOUSE & the Keyboard
- Start FSX - default aircraft stationary at any air port.
- Press **ALT\add-ons\FSUIPC**
- Choose "**AXIS ASSIGNMENT**" Assign each axis for each controller, as per the FSUIPC4 Manuals
- **Assign Yoke/Joystick**
 - Elevator ○ Ailerons ○ Mixture ○ PropPitch ○ Flaps
 - Pan Pitch ○ Pan Tilt ○ Pan Heading ○ Reverser ○ Rudder
 - Throttle ○ Other ○ Other
- **"Send Direct to FSUIPC calibration"**
- **Assign Pedals**
 - Rudder ○ Left Brake ○ Right Brake ○ Other
- **"Send Direct to FSUIPC calibration"**
- **Assign Throttle Quadrant**
 - Throttle 1 ○ Throttle 2 ○ Throttle 3 ○ Throttle 4
 - Mixture 1 ○ Mixture 2 ○ Mixture 3 ○ Mixture 4
 - PropPitch1 ○ PropPitch2 ○ PropPitch3 ○ PropPitch4
 - Reverser1 ○ Reverser2 ○ Reverser3 ○ Reverser4
 - Other ○ Other
- **"Send Direct to FSUIPC calibration"**
- **Assign Other Axis controller**
 - Other ○ Other ○ Other ○ Other
- **"Send Direct to FSUIPC calibration"**
- **NO duplicate axes assigned.**

Checklist for Calibrating Axes via FSUIPC4 in FSX

- Choose "**Joystick Calibration**" (11 tabs) Calibrate all axes as per the FSUIPC4 manuals
- 1 of 11 Main Flight Controls
 - Ailerons
 - Elevator
 - Rudder
 - Throttle (Single)
- 2 of 11 Prop, Mixture and brakes
 - Prop Pitch
 - Mixture
 - Left Brake – NB check ○ Rev
 - Right Brake – NB check ○ Rev
- 3 of 11 Separate Throttles per engine
 - Throttle 1
 - Throttle 2
 - Throttle 3
 - Throttle 4

NB Check ○ Map if using two throttles to map 4 engines.
- 4 of 11 Separate Mixture Controls
 - Mixture 1
 - Mixture 2
 - Mixture 3
 - Mixture 4
- 5 of 11 Separate Prop Pitch Controls
 - Prop Pitch 1
 - Prop Pitch 2
 - Prop Pitch 3
 - Prop Pitch 4
- 6 of 11 Trim, Spoilers and Flaps
 - Elevator Trim
 - Spoilers
 - Flaps
- 7 of 11 Reverser and other Trims
 - Reverser
 - Options
 - Aileron Trim
 - Rudder Trim
- 8 of 11 Cowl Flaps Controls
 - Cowl Flaps 1
 - Cowl Flaps 2
 - Cowl Flaps 3
 - Cowl Flaps 4

NB Check ○ Map if using two controls to map 4 Cowl Flaps.
- 9 of 11 Pan Axis etc
 - Pan Heading
 - Pan Pitch
 - Pan Tilt
 - Steering Tiller
- 10 of 11 Slew Axes
 - Slew Altitude
 - Slew Sideways
 - Slew Forward/Back
 - Heading

- 11 of 11 Separate Reversers
 - Reverser1
 - Reverser2
 - Reverser3
 - Reverser4
 NB Check ☐ "Activate for Jets only" for Jet Planes
- Set up any Buttons & Switches and Keys at this stage
- Check again - NO duplicate axis assignments
- Click "OK" to return to FSX
- Check that all axes, etc are working correctly.
- Reassign and re-calibrate if necessary;
- Start Flight and re-check controls until satisfied and then close FSX.
- Reboot the PC
- Open FSX and under "settings" ensure "Enable controllers" is still **unticked** ☐.
- Re-check the mouse and keyboard for axis assignment – remove as necessary
- Open FSX (Load the same default plane same airport)
- Press **ALT\add-ons\FSUIPC** check that your axis assignments are OK and that you are happy with your controls
- Reassign and re-calibrate if necessary;
- Fly!
- Repeat for other aircraft types as necessary and as described in the manuals.