History of FSUIPC

Version 3.90 (February 2009)

- A system of control setting "profiles" is now provided, which can be used in place of "aircraft-specific" settings for joystick calibrations, axis assignments, button & switches and keystroke assignments. With Profiles you assign aircraft to one of any number of specific sets of settings to suit your equipment and mode of operation. For example, you may have profiles for "Props", "Jets" and "Helicopters", or even splitting Jets into "Yoke" and "Stick" types. Whatever it takes to suit your specific set of controls and the aircraft you fly.

  There's a complete new section in the User Guide explaining this facility and how to use it.

- The problems arising with button and axis assignments when re-connecting multiple USB devices are now handled by facilities for the assignment of letters to named devices. Full details are provided in a new Chapter in the User Guide.

- The Joystick Calibration sections for the 4 throttles, 4 prop pitches and 4 mixture controls, all now include options for simple minimum-maximum calibration, with no "centre" values and thus no reverse zone.

- A revised Button repetition system is now implemented. The "**ButtonRepeat**" parameter is now automatically included in the default [Buttons] section of the INI file, and provides two values. The repeat rate and an initial delay. Details are provided in the Advanced User's guide.

- Support for the buttons and switches on the GoFlight SECM unit has been added (also in Wideclient 6.782). Note that for this to operate correctly you may need to update your GFDev.dll module.

- Users of PFC throttles, handled via my PFC drivers for FS, are now warned, in the Joystick calibration sections of the options dialogue, when the PFC driver setting (related to "Game Port" throttles, though meaning USB ones too) is suppressing the use of non-PFC throttle controls, so that they will know to turn that feature off in the PFC driver options. Alternatively, if this is needed only for selected aircraft, that suppression can be explicitly overridden by adding

  AllowSuppressForPFCQuad=No

  To the relevant JoystickCalibration section(s) in the INI file. Note that to avoid interference from the PFC throttles, they would still need to be 'parked' in a place where they supply no 'jitter' values, or switched off altogether in the PFC driver by assigning an blank User Configuration to the Quad for those specific aircraft.

- Flap axis calibration in FSUIPC3 has been changed to match that on FSUIPC4, and now manages to correctly operate the PMDG aircraft flaps levers as well as the default aircraft.

- Fixed the appearance of excessive axis "IN" values when axes are assigned in "RAW" mode and calibrated in FSUIPC.

- An error in the indexing of the negatively numbered calibration slopes (i.e. those numbered -1 to -15) is fixed in these latest releases. There has been a very long-standing bug which causes the smaller numbers (-2, -3 ...) to present the most extreme slopes, whilst the slightly flatter ones are at the -15, -14 end -- in other words, the reverse of the intention and the reverse of what is shown in the graphic when selecting them. The slope of -1 was incorrect too, but differently, emulating the +15, flattest, slope.

  This is now all fixed. But it does mean that any user currently using one of the -ve slopes and who is quite happy with it will need to re-select it when updating their copy of FSUIPC. You can either do this in the Options, choosing again the one you want, by sight, or by editing the Slope parameters in the [JoystickCalibration ...] sections of the INI file. For the latter, the correction would be:

      -1 change to 15
      -2 to -15 change to -14 to -1 (i.e. -16 - (current slope))

  The "new" -15 is steeper than the steepest one previously attainable.

- Some inconsistencies in how Aircraft- or Profile-Specific button and key assignments were being applied on a change of aircraft have been corrected. Previously, with some settings, only using the reload facilities in the FSUIPC options tabs made it operate them correctly. The main symptom of the bug was that both the generic and the specific assignments for the same buttons or keys would be activated, whereas of course the specific settings should always override the generic ones.

- The client program IPC interface has been made more resilient to bad data being supplied, to avoid crashing FS when incorrect data lengths and values are seen. Bad IPC requests are logged, but without the actual data unless IPC logging or "Extras" logging is enabled -- the latter is recommended generally, as otherwise the logs can get

very large. [Note that where the data is being corrupted by the caller using multiple threads to communicate to FSUIPC, the data logged may not actually be the same as the data found to be in error. This is because the caller's threads can still change the shared memory whist FSUIPC is trying to deal with it].

- The **ipc** library facilities for Lua plug-ins has been extended in two ways:

  (a) The addition of a new library facility, "ipc.ask", which prompts the user and receives a typed string response. This uses a similar display and input method to that used for entering mouse macro names.

  (b) The extension of the "ipc.readStruct" and "ipc.writeStruct" for multiple sequences of structures addressing different base offsets. The difference between this and using multiple calls is that they are all done in the same frame or access loop in FSUIPC, thus assuring that their relationships match precisely.

  The Lua documentation package will be updated with these changes in due course.

- Facilities have been added which will allow me to add new features via optional extra DLLs in future, much like the PFC, WideServer, GPSout and EpicInfo additions, but without necessitating further changes to FSUIPC itself.

Version 3.85 (November 2008)

- Two new offset values are added, providing the calibrated values for Rudder and Steering axes (when they are calibrated via FSUIPC). These may be useful for adding deflection indicators when the steering tiller option is in action, effectively stealing the real FS rudder input for steering. The offsets are:

0C08	2 bytes	Steering tiller calibrated value (if assigned and calibrated), -16384 to +16383
0C0A	2 bytes	Rudder calibrated value (if assigned and calibrated), -16384 to +16383

- Macro and Lua controls can be executed via the FSUIPC offsets programming interface. There are two new offsets involved, as follows:

0D6C	4 bytes	This provides the 32-bit parameter associated with any Macro or Lua call sent to the following offset (0D70).
0D70	40 bytes	Write here the complete identity string of a Macro control or Lua program control in order to have FSUIPC execute it.

  For a Macro, the identity string should begin with up to 16 characters giving the .MCRO file name (just the name part, not the type), and then, separated by a ':' character, the macro name within that file—again, up to 16 characters. Spaces either side of the ':' are optional. The case of the characters is irrelevant, but the spelling and spacing, if any, must be exact.

  For a Lua program operation, the actual Lua control should be provided, followed (with one space or ':' separator) by the Lua program name (without the .Lua suffix). The valid Lua controls are:

  > Lua, LuaDebug, LuaKill, LuaSet, LuaClear, LuaToggle

  For these, a colon (:) separator is only necessary when there is ambiguity—i.e. when the first word in the Lua program name is also part of the control name (like 'debug' or 'kill' etc).

  Note that any required parameter should always be written first for the LuaSet, LuaClear and LuaToggle controls as this specifies the flag to be changed (0–31). A parameter is never used with LuaKill.

  Whenever a parameter is to be supplied, for a Macro or Lua, it should first be written to offset 0D6C, above. Otherwise whatever was last written there will be supplied. It is best to write both parts in one Process call in case someone else changes the parameter in between.

- The TCAS options (selected in the Technical options tab and configurable automatically by FSUIPC client applications) can now be held fixed, completely unchangeable whilst FS is running, by adding the line **FixedTCASoptions=Yes** to the [General] section of the INI file.

- The flight/situation file pathname provided at offset 3F04 is now made to UNC standard (i.e. usable over a network) when it isn't a partial path, within FS's main path. You only need to check whether it begins with "\\" or contains an ':' character to determine if it is a full path. Else it will be a path within the FS path itself (as given, in UNC form, at offset 3E00).

- A serious problem is fixed in the range-control setting facilities for axis assignments. The bug caused Offset type controls to fail to show, along with their offsets, and any editing there would then lose the relevant lines in the INI file, once confirmed using OK.

- An error in the way offset 3414 was being set is fixed. This is a copy of the flaps setting destined for 0BDC.

- Added facilities for plug-in programs written in the free language "Lua". For full details please see the documents and examples in the separate ZIP inside the full FSUIPC.ZIP file you downloaded.

- The traffic zapper facilities now repeat faster, deleting successively further AI aircraft within the deletion zone. Before, you had to wait a second or so for the traffic tables to be updated.

- A new FSUIPC control "Traffic Zapall" is added (internal number 1085) which deletes AI aircraft within a vertical cylinder which has the range as the diameter (the range for user on-ground, or airborne, as applicable), and extending 500 feet above and below the user aircraft.

- For an airborne user, the normal Traffic Zapper control can be made to operate on the nearest aircraft in a vertical cylinder, instead of the default cone in front of the aircraft, by adding this parameter to the [General] section of the FSUIPC.INI file:

    ZapCylinderAltDiff=n

  where n is the maximum altitude difference (i.e. half the overall height of the cylindrical zone).

- Fixed the reverser axis facilities so that they operate over the actual range of the reverser on the current aircraft, not the fixed 0 to -25% (-4096) range assumed before. The calibration screens will normally still show -4096 but this is adjusted to suit the individual aircraft when in use.

- Fixed an error which caused FS to crash if the Mouse Macro creation session was started, but immediately cancelled before exiting the dialogue.

- Offsets 3412–3418 now provide the post-calibration axis values even when they are not disconnected using the flags in offset 341A.

- Fixed an error which prevented Key "release" assignments being recognised when multiple programmed keys are pressed and released in certain orders.

- Fixed an error which caused the new "No Repeats" option in the Key assignments dialogue to be cleared occasionally when re-entering the options.

- Corrected an error which caused Macros programmed for the release of keypresses to fail to reload from the INI file, even though they were being saved okay.

- Fixed a design flaw where any FSUIPC Directly assigned axis that should use an axis which is also specified to be "stolen" for use in some other way is still stolen. This happened even if that other axis was also assigned Directly, which makes even less sense.

  The most likely example of this which crops up is when the Reverser is calibrated in FSUIPC, and the Mixture axis is assigned Directly. The reverser steals the use of the Mixture axis, including the one assigned Directly, which is evidently wrong.

  Now no axis assigned Directly uses a "stolen" FS axis control, and no axis assigned Directly is allowed to be "stolen".

- ShowText, running on a WideClient PC, now correctly sees and displays the most recent types of Radar Contact menus.

Version 3.82 (July 2008)

- The Key assignment facility in FSUIPC now sports a "**No repeats**" option, to tell FSUIPC to ignore repetitions of the keypress caused by holding it down. This repetition is actually an automatic feature of Windows keyboard handling. With the "no repeats" checkbox selected FSUIPC only takes note of the first "KEYDOWN" message, not those marked as repeats. Windows sends a KEYUP message when ending the press repeats because the key is released.

- Wherever parameters for FS or FSUIPC controls are accepted (i.e. in the "parameter" edit windows in the Keys, Buttons or Axis assignments tabs, and in the relevant parameter fields of their INI file sections, the format:

    JnBm

  can be used, where n and m are both numbers between 0 and 255, inclusive. This form is converted into the decimal value

    (256 x n) + m

  For example, J3B6 would be taken as 774.

  The application for this is in specifying Button Flag numbers, which are composed of the Joystick number (Jn) and the Button number (Bm) is this fashion.

- The New Weather Interface (NWI) is changed in two small ways to make it a little more compatible to the version provided now for FSX (in FSUIPC4):

  First, the timestamp at offset C824 is changed when any valid NW_command is written to C800, not only when weather has actually been passed to FS as a result of an NW_SET type command. The only exception to this new action is when an immediate-action NW_command is send after an NW_SET but before the weather has actually been sent. This is to avoid such action being misconstrued as confirmation of the NW_SET.

  Second, the FSX facility "NW_GLOBAL" (command number 5) , which sets Global Weather mode in FSX, is now interpreted as the same NW_CLEAR (clear all weather) in FSUIPC3. Hopefully this will give any Global weather actually set in FS2004 more chance of being instigated.

- Multiple joystick axes assigned, in FSUIPC's Axis Assignments tab, to the same FS axis via the "direct to FSUIPC calibration" option are now arbitrated so that the last one giving the largest value (furthest from zero) is the one applied. This may now be a more useful way of assigning multiple controls than the rather fiddly method of using otherwise unused FS axes as described in the Advanced Users guide.

- Messages sent to FSUIPC for display on the FS screen can now be filtered and routed according to their first few characters. This is done by adding a new section ot the FSUIPC.INI file, as follows:

  [MessageFilters]
  Suppress=...
  SingleLine=...
  MultiLine= ...

  The "..." part is replaced by a list of up to 8 strings (in "quotes"), each of less than 16 characters. Messages sent to FSUIPC are compared with these. If they start with the same charracters (case ignored) then the action taken is as follows:

  Suppress: the message is discarded
  SingleLine: the message is treated as a single line message even if it isn't
  Multiline: the message is treated as a multiline message even if it isn't.

  For example: SingleLine="FDC","PM MCP" will route messages beginning "FDC" or "PM MCP" to the single line window, unless such messages are suppressed by FSUIPC option.

- The FSUIPC feedback control facilities, intended for programmers needing closer control for an external autopilot, are now generally accessible to users as added FSUIPC controls. You can assign key presses or buttons to the following extra controls:

  Fsuipc bank hold off
  Fsuipc bank hold on
  Fsuipc bank hold set
  Fsuipc bank hold toggle

  Fsuipc mach hold off
  Fsuipc mach hold on
  Fsuipc mach hold set
  Fsuipc mach hold toggle

  Fsuipc pitch hold off
  Fsuipc pitch hold on
  Fsuipc pitch hold set
  Fsuipc pitch hold toggle

  Fsuipc speed hold off
  Fsuipc speed hold on
  Fsuipc speed hold set
  Fsuipc speed hold toggle

  These should be self-explanatory. For the "Set" ones, put the value to be set as the parameter—only whole numbers, but okay for testing (degrees, knots, or 100 x mach). For the "on" and "toggle" controls the current pitch, bank, speed or mach becomes the target to maintain.

  Note that these are not perfect. In particular the Mach control facilities are inclined to hunt too much and really need tuning for each aircraft (which can be done by programmers, via information in the FSUIPC SDK). The bank and pitch hold facilities work quite well, however.

  One consequence of the changes to make these controls generally available is that they programmers version of the facilities no longer "time out"—previously the program operating the facilities would need to refresh the

enabling values every few seconds, otherwise they would relinquish back to user control. This no longer happens, so programmers supplying such autopiloting programs to users should advise them how to cancel the modes explicitly (e.g. via one or more of the "off" controls listed above) in the event of their program terminating prematurely.

- The "RemoveATC=Yes" facility now works in the German version of FS2004. It seems that the place where FSUIPC was obtaining the ATC window name, in Language.DLL, was only used for the Options menu, and in the German version of FS Microsoft appear to be abbreviating "Flugsicherung" to "FS" in that menu. It seems the ATC messages are included in the ATC.DLL, including the Window name (and despite the version numbers matching), so FSUIPC now gets the Window name from there.

Version 3.81 (April 2008)

- Added new "Mouse Macro" facilities, for adding button and keypress assignable controls for functions in add-on panels which are otherwise only controllable by mouse. These do not cover every such facility, but will help with many add-ons. When programmed, they do not actually use the mouse at all, but call the panel functions directly.

  Full advanced documentation is provided in the Zip, as two PDF files (one for users, one technical), and examples for the PMDG 737NG overhead and the APchart applications are provided, ready to use.

- Promoted the altimeter value (offset 3324) for faster updates. This should be up to date on each FS frame now.

- A new offset, 3410, is provided which includes flags for assorted control indications. At present the only bits used as as follows (bit numbers, 0 = 2^0):

  4   Engine 1 reverser inhibit (offset 32F8) is active with the reverser is engaged
  5   Engine 2 reverser inhibit (offset 32F8) is active with the reverser is engaged
  6   Engine 3 reverser inhibit (offset 32F8) is active with the reverser is engaged
  7   Engine 4 reverser inhibit (offset 32F8) is active with the reverser is engaged

  The reverser inhibit active flags are cleared when the inhibit is disabled or forward thrust is engaged. Setting the throttles to idle will not normally clear these indications.

- The ADF bearing and NAV radial offset values are now updated on every frame rather than only every fourth frame. Hopefully this will have negligible impact on performance—feedback on this point would be useful.

- An omission in the weather checking for FS2002 is fixed. In certain apparently very unusual circumstances user-defined weather can be set with unlimited visibility with the FS2002 weather structure having a Null pointer for visibility instead of the expected pointer to a standard visibility structure. When encountered this would crash FS2002, with FSUIPC.DLL being pointed to as the culprit module. I don't think this can happen on FS2004.

- If any aircraft names used with the aircraft-specific assignment facilities contain [or] characters, the manipulation of the saved INI file parameters goes completely haywire and nothing is saved correctly or reloaded correctly. This is because Windows uses [] to parenthesise the INI file section names, and extra such characters confuse it.

  To fix this, FSUIPC replaces such characters in the section names with (and). The original aircraft names are not affected, and nor is the visual representation in the dialogues. Only the saved parameters are affected.

  This change operates on all four parts which can have aircraft-specific settings–Axes, Buttons, Keys and JoystickCalibration.

- The Mouse Wheel elevator trim facility is extended by the addition of four keypress or button assignable controls:
  1080   Wheel trim toggle
  1081   Wheel trim faster
  1082   Wheel trim slower
  1083   Wheel trim speed toggle

  The toggle control turns the trim action on or off, the other three change the speed of its action when it is on. "Faster" means twice as fast (up to 16x), "Slower" half as fast (down to 1x), whilst the speed toggle switches between 4x and 1x speed.

  All four can be assigned in the drop-downs in Key and Buttons assignment tabs of the FSUIPC options. The Miscellaneous checkmark is effectively the same as the wheel trim toggle control.

Version 3.80 (March 2008)

- A facility is provided on the Miscellaneous options page to enable the Mouse Wheel as an elevator trim wheel.

- FSUIPC now discards the first 10 readings from an axis assigned in its Axis Assignments facilities, in case any of those a spurious values resulting from a dormant or uninitialised state of the hardware or its driver. This only loses the first half-a-second or so, and only occurs when the axis is first scanned, usually during FS initialisation.

- A 'macro control' facility has been added. This is primarily intended for add-on developers, allowing them to define additional controls to interact with their product which are then assignable in FSUIPC's Buttons, Keys, and Axis Assignments dialogues. Full documentation will be added to the Advanced User's guide in due course, but meanwhile a technical summary is provided in a text document within the ZIP.

- The 'PollInterval' parameter in the INI file [Buttons] section can now be set to 0 to prevent any button polling at all. If this is set even the 'Buttons and Switches' option page is removed. This may be useful when trying to track down an problem caused by rogue joystick drivers.

- The following additional values in the Offsets shown are now available from FS2004 (and, in two cases only, in FS2002, though untested):

Offset	Size	Description
04A8	8	Elapsed seconds, as a double (64-bit floating point).
0538	8	Design speed VS0 (stall speed full flaps), ft/sec, as a double (64-bit floating point).
0540	8	Design speed VS1 (stall speed clean), ft/sec, as a double (64-bit floating point).
0548	8	Design speed VC (cruise speed), ft/sec, as a double (64-bit floating point).
0550	8	Minimum drag velocity, ft/sec, as a double (64-bit floating point).
0920	4	Engine 1 torque, in ft-lbs (I think), as a 32-bit float. Not for jets.
09B8	4	Engine 2 torque, in ft-lbs (I think), as a 32-bit float. Not for jets.
0A50	4	Engine 3 torque, in ft-lbs (I think), as a 32-bit float. Not for jets.
0AE8	4	Engine 4 torque, in ft-lbs (I think), as a 32-bit float. Not for jets.
1334	4	Aircraft maximum gross weight, as a 32-bit integer, in lbs x 256.
34B0	8	Pressure Altitude (metres), double float. (FS2002 also)
34B8	8	Standard ATM Temperature, degrees Rankine, double float. (FS2002 also)
34C8	8	Total world velocity, ft/sec, double float.

These offsets correspond to those assigned for the same values in FSUIPC4 (for FSX)

- Since version 3.773 FSUIPC3 by default no longer intercepts FS axis controls which have been assigned in its Axis Assignments to be sent 'direct' to calibration.

  This should not really matter, as axes assigned directly should have been disabled in FS so no such controls should arrive. However, it seems that some add-on aircraft panels (most notably that for the LevelD 767) use some standard axis controls to operate the autopilot. If the FSUIPC calibration and slope changes are applied to them, it seems this can upset the A/P control.

  In case there are installations which do need both direct and indirect calibration to work on the same axis controls, this new action can be reverted by changing the **AxisInterceptIfDirect** parameter in the INI file from 'No' to 'Yes'.

- Faulty button signals which are repeating without control can now be explicitly ignored when trying to program the other buttons. Add a line in the form:

  IgnoreThese= j.b, j.b, ...

  in the main [Buttons] section of the FSUIPC4.INI. This lists the joystick number (j) and button number (b) of each button to be ignored. You can edit the INI file whilst in the Button assignments dialogue and simply press "reload all buttons" to activate any changes.

  Note that the action of ignoring buttons only applies to those numbered 0–31 on each possible joystick, and they are only ignored in the dialogue—if they are already assigned the assignment will still be effective.

- The option to "exclude THROTTLEn_SET" control calibration in the 4-throttles Joystick Calibrations page is removed in favour of a set of three similar options, one for THROTTLE, one for MIXTURE and one for PROP PITCH set controls. These are on their respective pages, and are now defaulted ON rather than OFF.

  These excluded controls are old ones, no longer assignable directly in FS, dating back to FS98 and before. They are now excluded from calibration (by default) because the only common use they have is by add-on panels looking to control FS axes accurately, and by users assigning special values to the controls via Key, Button or Axis Assignments to them.

- An error in the processing of INI file [Buttons] sections is corrected which would have previously caused comment-only lines to be deleted on some types of dialogue button changes.

- A small change has been made to the button options processing, to fix an error whereby deleted assignments might still be shown. Additional logging facilities, for guided diagnosis, have also been added.

- The FS message window interception is retried regularly until it succeeds. This may get over rare problems where the WINDOW.DLL module is not loaded initially.

- A special facility is added to eliminate short (transient) button press indications. This is intended to help deal with some devices which create occasional spurious button press signals.

  Add **EliminateTransients**=Yes to the main [Buttons] section in the FSUIPC.INI file to enable this. It operates only with locally-connected joysticks (but not EPIC or GoFlight devices). Note that enabling this option may mean you have to consciously press buttons for slightly longer. It depends on the **PollInterval**, another [Buttons] parameter, which defaults to 25 (milliseconds). A "transient" button indication is one which only exists for one poll, so a real press would have to last up to 50 mSecs to be sure of being seen (more, allowing for variations in the polling due to processor/FS activity). You may find you need to adjust the **PollInterval** too.

- A new FSUIPC control (number 1079) called "Traffic Zapper" is provided. This can be assigned to any keypress or joystick button. When used it deletes the nearest AI aircraft which is within the following constraints:

  (a) if the user is airborne, within a default 1.5 nm range, and also within just 2.5 degrees relative bearing ahead of the user aircraft and 5 degrees elevation (above or below), or

  (b) if the user is on the ground, within a default 0.25 nm range, and also within 15 degrees relative bearing ahead of the user aircraft, and 5 degrees elevation (above or below).

  If no aircraft qualifies, the control does nothing. If an aircraft is deleted, a sound is heard. By default this is the "firework" wave file in the FS sound folder. You can change it in the FSUIPC.INI file by providing a different sound name for the **ZapSound** parameter -- it must be the name of a WAV file in the FS sound folder. Or, if you do not want a sound just set it to **ZapSound=None**. However, the reason for the sound is so that you know something has been Zapped. FSUIPC cannot tell what you can see, and the aircraft which is zapped may not be in your display so you may not see it disappear.

  The range of operation of the zapping facility can be adjusted by using two optional parameters in the [General] section of the INI file. These are, with the current defaults:

      ZapAirRange=1.5
      ZapGroundRange=0.25

  The "Air/Ground" refers to the user aircraft, not the target, and the units are nautical miles. Note that you cannot change the acceptance angle explicitly. It is adjusted automatically, in linear inverse proportion to the change in the range -- so with a larger range you would need to point the aircraft nose more accurately.

  For most users and most purposes the defaults are recommended.

- A facility to operate bank trim on helicopters is provided. This "helo trim" uses FS aileron trim INC/DEC controls, accessible by assignment in FSUIPC, or the special aileron trim axis assigned and calibrated via FSUIPC, to modify the end value on the "X" (aileron) axis of the cyclic. To use this you need to ensure that the axis is calibrated through FSUIPC (as the aileron axis), and add "ApplyHeloTrim=Both" to the appropriate [JoystickCalibration …] section(s) in FSUIPC.INI. Note that this enables the pitch trim option as well. As a precaution, the trim value will never be added to the aileron axis if the normal aileron trim is non-zero. The new "helo trim" value is maintained in IPC offset 0C06 (range −16383 to +16383) which can also be written to for external program control.

- The facilities to intercept axes so that they can be applied through external algorithms (such as fly-by-wire) are extended to include the toe brake axes (AXIS_LEFT_BRAKE_SET and AXIS_RIGHT_BRAKE_SET), the Flaps (AXIS_FLAPS_SET) and the Spoilers axis (AXIS_SPOILERS_SET). For these there are new offsets as follows:

341A	1 byte	Axis inhibit flags:
		    2^0 = Left brake
		    2^1 = Right brake
		    2^2 = Flaps
		    2^3 = Spoilers
		
		This byte is cleared after about 10 seconds to safeguard axis operation against a crashed application. To sustain the interception, therefore, the value needs to be refreshed every few seconds.

3412	2 bytes	Spoiler axis input value. Copy this to 0BD0 for normal brake action
3414	2 bytes	Flaps axis input value. Copy this to 0BDC for normal flaps action

| 3416 | 2 bytes | Left brake axis input value. Copy this to 0BC4 for normal brake action |
| 3418 | 2 bytes | Right brake axis input value. Copy this to 0BC6 for normal brake action |

Note that offset 341A is "write only" in the sense that reading it will only supply zero, not the value just

This change is specifically designed to allow Project Magenta's pmSystems to be programmed to control subsystems dealing with the brakes. Apparently the need to re-write the intercept flags regularly is not easily possibly in pmSystems programming unless the value read is different from the one written. I think this is an efficiency matter.

- Many of the data values extracted from FS by FSUIPC are now extracted at faster rates, for more smoothness in applications. This relaxes restrictions originally put in place several years ago to avoid affecting FS performance. These days, with such powerful PCs (in FS2004 terms, not FSX) I suspect that FSUIPC operating more often inside FS will not be noticeable -- but if it is, please let me know!

- A bug is fixed which affected the calibration of the four separate Mixture axes. The bug caused the output values to jump from 8192 to around 12288. This was due to the attempted provision of asymmetric slopes for off-centred "centres". The Slope option is no longer offered for these axes.

Version 3.75 (June 2007)

- The elevator trim facilities on the GoFlight LGT module are again recognised as a set of 4 buttons (two in each direction.

- The FS2000-compatible Advanced Weather Interface (AWI), as used by WeatherSet and some other programs (including WidevieW) is now capable of setting above-ground lower altitudes for the single visibility layer.

- A possible recursive loop, causing FS to crash, resulting from trying to use a virtual button to repeatedly change a virtual button, is fixed. Virtual buttons are those represented by bits in the 36 bytes from offset 3340.

- A long-standing error in offset 3300 flag operation has been fixed. Before now the NAV2 ILS flag would not be set, even if NAV2 were tuned to an ILS, if NAV1 was not tuned to a VOR or ILS.

Version 3.74 (April 2007)

- Fixed an error in the saving of Aircraft-specific KEY settings. The section in the INI file was incorrectly headed [Keys.], without the actual aircraft name part being filled in.

- The Gyro Compass value is now available (on FS2004 and FS2002), in degrees as a double floating point value (64-bit) at offset 2B00.

- Facilities are added for four of the "Miscellaneous" options to be controlled in an aircraft-specific way, provided that a separate Joystick Calibration has been set for such aircraft. This involves INI file editing and is explained in a text READ ME file in the Zip. the options so supported are:

DisconnTrimForAP	Disconnect elevator trim axis for A/P
ZeroElevForAPAlt	Centre elevator on A/P Alt mode changes
PatchSimApAlt	* Enable V/S sign correction (& A/P patching on FS2002)
CorrectVSsign	* Enable V/S sign correction (FS2004)
ReverseElevatorTrim	Reverse the elevator trim sense

* Note that for FS2004 the 'PatchSimApAlt' parameter is re-named 'CorrectVSsign' (automatically)

- The weather logging facilities have been tidied a little to show altitudes converted from metres to the nearest 10's of feet when less than 1 metre from such a value.

Version 3.73 (March 2007)

- Fixed a problem with offsets 077C, 078C and 079C, which stopped working in 3.72 or before.

- Added four new direct axis controls for assignment in the Axis assignments tab. These are

    Aileron/SlewSide, Elev/SlewAhead, Rudder/SlewHdg, Throttle/SlewAlt

These send the normal controls in flight mode, but the Slew controls in slew mode. They have to be independently selected and calibrated in the FSUIPC Calibrations tab, whilst in the correct relevant FS mode.

- If FSUIPC detects that FS is running on Windows Vista, it moves, and subsequently maintains the LOG, INI and KEY files, to/in the Documents "Flight Simulator Files" folder—the same place that FS saves the user's Flights and Plans.

However, tests so far have shown that Vista runs FS2004 (and presumably earlier versions) in a compatibility mode, pretending to be WinXP SP2. FSUIPC therefore does not detect Vista, and so uses what it thinks is the Modules folder in the main FS folder. If you installed FS in the default place (Program Files …) this should give problems with write protection, but it seems Vista places these files into a "compatibility" place, aliassed to the Modules folder, so it all seems to work … somehow!

- If the FSUIPC.DLL signature is not valid for any reason, FSUIPC will not function correctly at all, and will also act as if unregistered. Now, as well as Logging this problem, FSUIPC will warn the user via a Message each time any access is attempted to the Options menu.

Version 3.72 (February 2007)

- FSUIPC is now digitally signed, and this signing is used to check the validity of the install.

- Fixed several problems which were possible causes of CTDs (Crashes To Desktop) in versions 3.705 to 3.719. Certainly one specific cause has been fixed, and extensive testing has shown the base release on which 3.72 is built (3.719c) to be very stable.

- Full support is added for the GoFlight EFIS module (up to two of them). Although this was supported before, it was completely untested, and the Mode and Range selectors were difficult to deal with. Now each of the positions of these selectors give a different FSUIPC button number. The other difference is that the Minimums and Baro dials only have two button numbers, one for each direction. There is no distinction between "fast" and "slow" operation as there is for other GoFlight rotary encoders.

- The joystick Calibration "REV" facility, to reverse the direction of the lever or knob used to input the axis values, is made to reverse the INPUT values instead of the OUTPUT ones. This should make it much easier to calibrate things like Spoiler ARM and Flap detente positions on levers operating in reverse.

  Note, however, that there is a possibility that this change may upset some existing calibration settings where REV has been used. Please, when you install this update, do go through each of your FSUIPC-calibrated axes and recheck all those with the "REV" option checked.

Version 3.71 (November 2006)

- Program access checking via application keys is removed in this version. Commercial users are still expected to make appropriate agreements regarding licensing, and stick to those already made, but freeware access is now unencumbered.

- The aircraft name is now displayed in the Options title bar when the Joystick Calibrations are aircraft-specific.

- Fixes a problem with [Keys] programming which occurred if there are comments added to the end of a line with a '+' or '/' character included.

- Fixes an error in the Joystick Calibrations when aircraft-specific calibrations are being made and the "ShortAircraftNameOk" parameter is left to its default 'No'. This problem would have caused FSUIPC to load the wrong calibrations from the INI file, or, worse, none at all.

- The following additional offsets are now mapped to provide access to values connected with the HSI. These should work in both FS2002 and FS2004, but have only been checked (with mixed results as noted) in FS2004 so far:

Offset	Size	Description
2F88	8	HSI CDI needle position, −127.0 to +127.0 double floating point. The full range represents −10 to +10 degrees for a VOR, −2.5 to +2.5 degrees for a LOC
2F90	8	HSI GSI needle position, −119.0 to +119.0 double floating point. The full range represents −0.7 to +0.7 degrees
2F98	8	HSI speed, as a double floating point in metres/sec.
2FA0	8	HSI distance, as a double floating point. In metres.
2FA8	2	HSI bearing in degrees.
2FAA	1	HSI CDI valid flag
2FAB	1	HSI GSI valid flag
2FAC	1	HSI bearing valid flag. (Not seen this set yet—see 2FA8)
2FAD	1	HSI To/From flag: 0=off, 1=To, 2=From
2FAE	1	HSI 'has localiser' flag

Version 3.70 (July 2006)

- The **ShortAircraftNameOk** parameter can now be set to '**Substring'** to make FSUIPC accept aircraft names with the INI file aircraft name included as a sub-string anywhere within the full name. This gives more flexibility in applying aircraft-specific assignments, and applies to all sections using the facility (i.e. **Axes**, **Calibrations**, **Buttons**, and **Keys**).

- Additional offsets are provided for water rudder data from FS:

    2A78 water left rudder position (double)
    2A80 water right rudder position (double)
    2A88 water rudder handle position (32-bit BOOL)

- An error is fixed in the Buttons and Keys assignment facilities. This could have disabled the final button or key assignment left when the penultimate one is deleted.

- Bit 2^4 (value 16) in offset 330C is set when the FSUIPC Hot Key for throttle synchronisation is used and the sync engages.

Version 3.65 (June 2006):

- Most importantly, this fixes an error in 3.60 which makes it crash towards the end of June with a Beta-version expiry message!

- A new axis control is added, for direct assignment in the Axis assignments tab, for a Steering Tiller. This uses the FS Rudder control, but can be calibrated separately (eg to be more responsive -- use the inverse S-shaped slope options).

    If the steering tiller axis is assigned, you must then calibrate it in FSUIPC's Joysticks section (this is on the same page as the PAN controls, sorry). It is then used as follows:

    When on the ground and at any ground speed less than 60 knots (default -- adjustable by MaxSteerSpeed parameter in the INI), the actual FS rudder action is controlled by a blend of the tiller and rudder axis inputs. At low speed it is predominantly tiller, and as speed increases the tiller becomes gradually less effective and 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, assigmnents and parameters such as MaxSteerSpeed, can be different for different aircraft.

- The axis assignments facility has been thoroughly overhauled internally to make the "aircraft specific" aspects work more reliably and usefully. In the original release it was easy to get things tangled up between axes generally applied and those which should have been specific to the current aircraft, and the saved parameters were often in error.

    Now FSUIPC 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. The short aircraft name option (needing INI file editing) applies just as for Buttons, Keys and Calibrations.

    When the aircraft specific option is selected for an aircraft you are now 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.

    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.

- A bug is fixed that corrupted the Payload Count value being read from offset 13FC. The value supplied by version 3.60 was very large, and any program not imposing the limit of 61 documented in the Programmer's Guide may appear to hang whilst attempting to read the millions of entries. Etienne Martin's pushback gauge (ATN) is one such application, there may be more.

- An error on FS2004 that could, on some systems, cause the AI traffic information to omit the runways in use, is fixed. This would have affected Radar Contact 4 users.

- Buttons and dials on recent GoFlight devices, such as the MCP Pro, should now be detected correctly by FSUIPC's Button programming facilities. This needs an up-to-date copy of GF's "GFDev.dll" (version 1.61.02 or later, dated May 2006), available from my Support Forum.

- Messages to FS's message display are now not suppressed when FS is busy with a dialogue or progress bar showing. Apparently this could have caused time zone messages to be missed with FSRealTime.

- The INI option "RemoveATC=Yes" should now work on non-English versions of FS. It appears that the Window name is language dependent.

- Additional FSUIPC offset controls are provided to deal with floating point values:

  Offset float32 set/1000   (encoded 7000zzzz)
  Offset float64 set/1000   (encoded 7400zzzz)
  Offset float32 inc/1000   (encoded 7800zzzz)
  Offset float64 inc/1000   (encoded 7C00zzzz)

  In each case the parameter is a signed 32-bit integer, but this is divided by 1000 (decimal) in the appropriate floating point format before it is written to the offset specified (zzzz in the above encodings, but entered as xZZZZ in the on-line dialogue). For "decrements" use a negative parameter in the increment controls.

- FSUIPC supports the new facilities in WideFS (version 6.599a or later) to copy files from anywhere on the FS system to any WideFS client PC. Please see WideFS for more details.

Version 3.60 (29th April 2006): This version of FSUIPC embodies some major new facilities which have been on my list for a long time and which have finally made it. One of the results is the renaming of most of the Tabs in the Options screen, which has now been extended to two tiers through additional features.

- For FS2004 (only), FSUIPC now 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 FSUIPC which previously would only look right in AdvDisplay, such as (and particularly) the Radar Contact menu window.

  You do not need AdvDisplay installed to use this facility. You also now do not need AdvDisplay installed to support ShowText windows on a networked PC—ShowText will now work with FSUIPC alone, for multi-line messages (like Radar Contact's) *only*.

  Not only is this part of FSUIPC, but it is a free part of FSUIPC, just as AdvDisplay was. Options concerning the FSUIPC message window appear on the About/Register screen, which is available to all FSUIPC users.

  If AdvDisplay is not installed, then the feature will already automatically be enabled when FS is first loaded with this new version of FSUIPC installed. It can be turned off (to use only ShowText for example) in the front option screen—the other option there, to stop the multi-line messages going to FS's default message window, would then need enabling.

  If AdvDisplay is installed, then it is disabled initially, and everything is like it was before. However, the new window can be enabled in the front option screen. AdvDisplay is still useful for gauge-like installation in panels, and to divert and contain single-line messages like FS's ATIS and messages from many programs, but it will not be maintained or supported from now on.

  The new 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 the latter are saved. The details go into a section with the window name.

  There are no scrolling facilities for messages in this Window, but the delays operate. The window only disappears when it is empty, but FSUIPC recognises the AdvDisplay hot key and will toggle the window on and off just as it does for AdvDisplay.

- The new message window has a title (default "FSUIPC Window"), which can be set by the program using it, but as only one such Window is supported only one title is available. The first program writing it then a multiline message wins! Programs write their 32-character (max) zero terminated title to IPC offset 6D60. This only needs doing once, immediately before any multiline messages are sent to 3380.

- The AdvDisplay toggle facility is now also available as an FSUIPC control, assignable in the Button options.

- The AdvDisplay hotkey and WhiteMessages options are available to unregistered users, but only by editing these in the FSUIPC.INI file. The Advanced User's document gives details.

- An option is also provided to suppress single-line messages altogether. This is to replace another lesser-used application of AdvDisplay to handle unwanted screen messages, including those from FS such as ATIS and multiplayer logins/outs.

- A facility to operate pitch trim on helicopters is provided. This "helo trim" uses the normal FS elevator trim controls (and axis) to modify the end value on the "Y" (elevator) axis of the cyclic. To use this you need to ensure that the axis is calibrated through FSUIPC (as the elevator axis), and add "ApplyHeloTrim=Yes" to the appropriate [JoystickCalibration …] section(s) in FSUIPC.INI. As a precaution, the trim value will never be added to the elevator axis if the normal elevator trim is non-zero. The new "helo trim" value is maintained in IPC offset 0BBE (range −16383 to +16383) which can also be written to for external program control.

- If you are using a weather setting program which tries to set cloud types not supported in FS2004 (resulting often in an eventual crash in Weather.DLL), you can now add the parameter "CloudTypesFixed=Yes" to the [General] section of the FSUIPC.INI file. This tells FSUIPC to map all supplied cloud types to one of those known, i.e: 1 (Cirrus), 8 (Stratus), 9 (Cumulus), 10 (Cumulonimbus).

- An INI-file only option, "StopAutoFuel=Yes" is provided on FS2002/4 to stop automatic re-fuelling at scenery fuel boxes. With this selected you can only increase fuel via the FS menu or by using a program or gauge which does it via FSUIPC's offsets.

- Thanks to discoveries by Matthias Neusinger, additional offsets for view modes and settings are now available in FS2004 (and most in FS2002 too), as follows:

8320	1	Byte value, the view mode in currently selected window (read/write): FS2004: 1=cockpit, 2=virtual cockpit, 3=tower, 4=spot plane, 5=top down FS2002: 0=cockpit, 1=virtual cockpit, 2=tower, 4=spot plane, 7=top down
832C	2	Word, zoom value for cockpit mode in currently selected window (read/write): 64=1x
832E	2	Word, zoom value for virtual cockpit mode in currently selected window (read/write): 64=1x
8330	2	Word, zoom value for tower mode in currently selected window (read/write): 64=1x
8334	2	Word, zoom value for spot plane mode in currently selected window (read/write): 64=1x
8336	2	Word, zoom value for top down mode in currently selected window (read/write): 64=1x
833C	2	Word, spot plane direction from user aircraft (read/write), degrees in usual 65536/360 format
8340	4	Dword, spot plane distance from user aircraft (read/write) meters * 256
8345	1	Byte, spot plane gradual transition (read/write) 1=off, 0=on
8348	4	Dword, spot plane altitude difference from user aircraft (read/write) meters * 256
83BC	24	View point lat, lon, alt, same as at 05B0 (read only, FS2004 only)
83D4	12	View direction: pitch, bank, heading, (read only, FS2004 only) in same format as for user aircraft P,B,H at 0578

- The "in menu" indication at offset 3365 is now reliable when using WideFS as well as when reading it locally on the FS PC.

- Relative bearings to VOR1 and VOR2 are now provided in degrees (0–359) in offsets 0C56 and 0C5C, respectively. These are both 16-bit integers.

- Facilities are provided for programs to manipulate aileron and rudder trim values, even when the latter are assigned to axes. The details are:

Byte 04A0 is written to activate the interception:

$2^0 = 1$ to disconnect aileron trim (2EB0) from FS

$2^1 = 1$ to disconnect rudder trim (2EC0) from FS

This byte will be cleared and the connection restored (together with the most recent axis values) within about 10 seconds of it being written non-zero, so you need to write this every few seconds.

Double 0480: Read-only, the aileron trim axis input is available here.

Double 0488: Read-only, the rudder trim axis input is available here.

Double 0490: Write the required aileron trim value here: it will be sent to the FS if and only if the axis is disconnected above.

Double 0498: Write the required rudder trim value here: it will be sent to the FS if and only if the axis is disconnected above.

Note that the values are in radians, and the range seems to be –0.2 to +0.2.

- A bug in the FSUIPC-added controls for ADF in-use frequency decrements is fixed. Decrementing from x00 to (x-1)99 actually resulted in some completely incorrect value.

- When the International options in FS are set for altitudes in metres, the Miscellaneous option for the autopilot altitude fix went wrong—it computed things in the wrong units! The error resulted in levelling off at the wrong altitude, and the V/S sign reversal resulted in differences in the target V/S too.

- AI aircraft are now not discarded from the TCAS tables when they appear to be below ground, unless they are computed to be more than 3 metres below. This is to try to allow for those small scenery ground level discrepancies that sometimes occur, resulting in AI aircraft sinking into the tarmac but still operating normally.

- In FS2004 only, the TCAS table value for AI traffic's COM1 radio frequency now gives 0x9999 (reading a frequency of 199.99) when the specific aircraft are placed into 'slew' mode. (Slew mode is used for some control of AI traffic by programs like AIsmooth, AIseparation and Radar Contact 4). TrafficLook will therefore now show those aircraft being so controlled.

- The spoiler (speed brake) calibration facility allows a specific zone to be calibrated for the Arm détente. An improved method of driving the Spoiler (speed brake) is activated when it is calibrated with such a zone. The range below this Arm zone is always all 'spoilers down' (zero), but the range above the Arm zone now exactly matches the range actually supported by FS—which is 7% to 100% deployment. The difference will be seen by the smoother operation of the spoiler handle on the airliner panel quadrants.

- Extensive axis assignment facilities have been added, allowing a range of things to be done with joystick axes. These facilities also work for PFC axes as long as the PFC.DLL is version 1.994 or later.

- The flaps calibration facilities now allow specific individual calibration for each détente on a proper flaps axis implementation.

- Additional FSUIPC-implemented controls are added to send Key Presses to FS, for use in some of the facilities above but also to make it easier than programming the Windows keydown and keyup sequences needed by the IPC facilities at offset 3200. These new controls are available in the Buttons and Axis control options drop downs, but, more importantly, they can be easily sent via offset 3110 from external programs, including across WideFS links. The controls are:

1070	Key Press and Release
1071	Key Press/Hold
1072	Key Release

The parameter for this gives both the keycode and the shift codes—both as listed in the Advanced User's guide. The parameter must hold the shift code in bits 8–15 and the keycode in bits 0–7. In other words, the value is:

Keycode + (256 x Shift code)

A shift code of zero is the same as 8 (i.e. no shifts).

To make it easier in the dialogue drop-downs these values can be entered as 'Keycode+Shiftcode', that is literally with the '+' as a separator. Examples of this occur in the Axis Calibration section of the User guide.

- FSUIPC now delays the initial setting of the "touchdown V/S" value at offset 030C until it sees the simulator as "ready to fly". Hopefully this will remove invalid spurious values appearing at that offset initially.

- A delay of five seconds is now imposed on the checking of access accreditation for aircraft Gauges when a new aircraft is loaded. This will hopefully remove any problems whereby the same correctly accredited gauge, installed in two aircraft, is spuriously rejected by FSUIPC when changing from one to the other of those aircraft.

- A special facility is provided to apply patches to FS2004's "ATC.DLL" module, to forcibly prevent the FS ATC windows from appearing at all, and to prevent any of three different crashes which can occur in ATC.DLL when running FS with third party ATC programs and FS's ATC turned off.

This facility is activated by adding the line "RemoveATC=Yes" to the [General] section of the FSUIPC.INI file.

Note that this should *only* be used when you absolutely do not want FS's ATC to apply to your flights, for instance, when you use only Radar Contact, or possibly VoxATC.

This facility does not prevent the ATC voices, the AI traffic vocal interactions and ATIS read-outs. You may want those as additional chatter in any case, but if not just turn off the ATC sound, or turn it down, in FS's sound options.

- FSUIPC can apply delays to any axis assigned through its Axis Assignment facilities. The delay is limited to a minimum of 2 x the axis polling interval (PollInterval, which defaults to 10 mSecs) and a maximum of 200 x this interval (i.e. 2 seconds with the default polling interval). Delays for axes have to be edited in the INI file, as described in the Advanced User's guide. There is no facility to change them or even see them in the option screens.

- An error in the FS2000 mapping, making the value at 2F78 (AI bank) the same as the value at 2F70 (AI pitch) is fixed. This has *always* been an error, only just discovered over six years later! ;-)

Version 3.53 (1st January 2006)

- Now validates FSUIPC and WideFS registrations issued during 2006. (Version 3 of FSUIPC wasn't originally expected to have to last this long, as normally one sees a new version of Flight Sim every two years!)

- Fixes a problem where flights being saved could not be set as 'default' at the time of saving.

  Oddly, this problem has been present, on and off, in FSUIPC for at least five years, across three versions of FS, but was not actually reported until the day 3.52 was released. It is due to the intercepted Save Flight routine in FS being a function, returning a value, whereas it was defined as a procedure without a value in the header files used in FSUIPC.

- Fixes an error in the facility to write the "tug speed" at offset 31FC. Also notes about these two tug controls are added in the next Programmers Guide edition—they appear to be related to glider aircraft towing, not to the pushback option as I originally thought when I placed the offsets so carefully! Wink

- Provides the following new offsets, all read-only:

0300	2	VOR1 DME distance, 16-bit integer, nm * 10 [FS2002+]
0302	2	VOR1 DME speed, 16-bit integer, kts * 10 [FS2002+]
0304	2	VOR1 DME time to station, 16-bit integer, secs * 10 [FS2002+]
0306	2	VOR2 DME distance, 16-bit integer, nm * 10 [FS2002+]
0308	2	VOR2 DME speed, 16-bit integer, kts * 10 [FS2002+]
030A	2	VOR2 DME time to station, 16-bit integer, secs * 10 [FS2002+]
030C	4	Vertical speed, copy of offset 02C8 whilst airborne, not updated whilst the "on ground" flag (0366) is set. Can be used to check hardness of touchdown (but watch out for bounces which may change this). [FS2002+]

  The first six are provided just so that simple display systems, for instance those using my own GFdisplay program, can display the DME values with ease. They will normally be the same as those in offsets 0C29 ff, but possibly with greater range.

Version 3.52 (December 2005)

- The 3.51 fix in the wind smoothing algorithm was in error, making matters worse rather than better. In 3.52 the *correct* fix has been found and applied. In this version the winds, when smoothed, still have the correct cross and head components, and the results when the direct wind control option is exercised (as by ASV) are also good without the sudden swings in direction. Even better, the problem with direct wind control on the ground has been fixed, so everything is now fully compatible.

- In FS2004 the FSUIPC Wind options page now sports a new option, on the right-hand side, to limit the amount of wind variance which can be applied by external weather programs. Wind variance is fluctuation in wind direction. It is suppressed completely in any case if you suppress all gusts, but otherwise it isn't subject to smoothing.

  The new Wind control option allows the user to enforce a limit on the wind variance being set by external weather programs. The limit placed on variance is progressively lower as wind speed increases. Winds of 0–5 knots will be allowed to vary fully, but 100 knot winds will have the variance limited to 10 degrees either way.

  This option is off by default, and is saved in the INI as **LimitWindVariance**.

- The facility to disconnect the joystick axis controls (offsets 310A and 310B in the FSUIPC interface) is extended to allow this disconnection *not* to be applied to the older FS98-compatible axis controls, These are:

      AILERON_SET
      ELEVATOR_SET
      ELEVATOR_TRIM_SET
      RUDDER_SET

THROTTLE_SET
and the four THROTTLEn_SET controls.

This is intended to allow those add-on aircraft that implement their own Autopilot to use these controls to set the relevant values, instead of writing them directly to the specific offsets.

To activate this facility the program/gauge/module must set the 2^1 bit in the byte at offset 3109, at the same time as setting the axis connection override bits in 310A/310B. The setting expires in the same interval.

Note that if the users of such aircraft calibrate the four separate throttles in Page 3 of the FSUIPC options they will also need to check the option at the bottom of that page, to prevent FSUIPC changing the THROTTLEn_SET values sent by the separate autopilot.

Version 3.51 (December 2005)

- This version implements a much more efficient method for controlling AI aircraft in FS2004 (only). The relevant control facility is being used by the latest version of Radar Contact, and also by programs such as AI Smooth and AI Separation. It looks like the new methods used in FSUIPC have quite a beneficial effect on these programs.

  For FS2002 some improvement has been achieved by increasing the command queue size for AI traffic control so that it doesn't overflow and possibly lose commands, and also by increasing the percentage of traffic processed per FS frame in proportion to the numbers of traffic commands pending.

  In the unlikely event that the new FS2004 AI traffic control method proves unstable (it has been fine in testing), it can be turned off by changing the INI file parameter **TrafficControlDirect** from 'Yes' to 'No'. Then FSUIPC will operate on FS2004 in the same way as it does on FS2002—i.e. with a larger queue and dynamic processing.

- The minimum visibility option now applies to all weather, including FS's own local and global weather, on FS2002 and FS2004. However, if it is being imposed on FS's own weather the current visibility will not be reported correctly in weather reports such as those read by external programs and ATIS in FS. This is because the only way of imposing the visibility minimum is by changing the effect at the end stage, the rendering at the aircraft, and not in the weather system as such.

- A facility to specify a *minimum* icing level in clouds set by external weather programs is provided, but this is only applicable by editing the INI file. The parameter is **MinIce** and takes the same value range as **MaxIce** with zero and negative values turning it off.

- Engine 1 Torque and Fuel Pressure offsets (08F4 and 08F8) are now working properly again for relevant aircraft as well as helicopters.

- Ground based aircraft showing as below sea level did not appear in the TCAS tables, even though they were legitimately at that altitude (for instance at Amsterdam and Rotterdam). This is because FSUIPC filtered out aircraft below ground to remove some poorly behaved AI which descend through the surface and continue to fly underground.

  This didn't come to light until experimentation with putting individual AI aircraft into Slew mode sometimes led to them disappearing from FSUIPC's list even though they were still clearly present in FS. Apparently the altitude for aircraft in Slew mode is measured from the wheel touch points, whereas in normal mode it is from the central datum.

- A long-standing bug is fixed in the wind smoothing algorithm which could occasionally make the actual wind effect at the aircraft 180 degrees opposite to that shown as the ambient wind (e.g. by Shift+Z). Additionally this fix makes the wind direction written to offset 2DE0 have the correct effect at the aircraft.

- The slopes associated with axis calibration are now correctly saved to the FSUIPC.INI file even if nothing else in the Joysticks pages has been changed.

- If a slope is applied to a reverser axis in FSUIPC's Joysticks facilities, the reverser would behave very weirdly. The slope facilities are only intended to work for symmetrical axes, or only on the positive parts of asymmetric ones. Reversers have no positive parts, so the application of slopes went wrong. In this version FSUIPC ignores slope application to reversers and, in fact, hides the slope buttons for them.

- A bug in the facilities for additional co-pilot controls (AileronB, ElevatorB, RudderB, and so on) is fixed. In recent versions merely adding these would have prevented any joystick calibration inside FSUIPC, and thus failing to correctly apply the co-pilot values.

- Wind gusts set through the New Weather Interface (NWI) are now limited to prevent outrageous variations. Any gust value specified above 30 knots is limited to 8 times the layer's wind speed.

- The mapping tables are improved to prevent several previously possible accesses into parts of FS2004 which are not always present, thus causing program crashes with 'Access Violation''.

- The Engine 1 Rotor RPM value at offset 0908 is now working for helicopters which are made without using the actual helicopter model type, such as the default Robinson R22.

- For FS2004 only, the dew point at the aircraft is now provided at offset 0E8E, as a 16 bit value giving degrees C times 256. This is calculated by FSUIPC, not provided by FS, by linear interpolation between the two nearest temperature levels defined for the location—or the next two above when below the lowest, or two below when above the highest. Note that if FS does not use linear scaling for temperature between the layers then this value will only be an approximation.

- "Adventure" texts displayed in the FS screen using FSUIPC offsets 3380 and 32FA can now be forced to use the white text, even if the user has not selected that option. This is done by adding 16384 to any zero or positive value written to 32FA, or subtracting 16384 from a negative value. The effect only applies to the message written in this instance.

  Note that this facility is only compatible with version 2.14 of AdvDisplay or later.

- More precise values for the VOR glideslope and localiser needle offsets are now available, though they do not seem to be updated much more often than the older FS98-compatible single byte approximations. They are all in 32-bit 'float' format as follows:

2AAC	VOR1 LOC needle, 4-byte FLOAT32
2AB0	VOR1 GS needle, 4-byte FLOAT32
2AB4	VOR2 LOC needle, 4-byte FLOAT32
2AB8	VOR2 GS needle, 4-byte FLOAT32

Version 3.50 (August 2005—there was no 3.49) includes these fixes and enhancements:

- Joystick calibrations and mappings can be made specific to different aircraft, so that you can calibrate precisely for different characteristics in vastly different aircraft types. All of the entries in the [JoystickCalibration] section of the INI file can be made specific to one particular aircraft (by name) or a number of aircraft (by shortening the name), much like the already-published facilities for aircraft-specific Keys and Buttons. Unlike Keys and Buttons, however, the calibrations cannot be mixed. The whole section is applied when the name matches—if no name matches then the defaults, in the original section, apply.

- Response curves ("slopes") can now be applied to any of the calibrated axes, not only the main flight controls. There are inverse slopes provided too (i.e. ones with steeper responses near centre, smoothing out at the extremes). For those axes that utilise off-centred centres (reverse zones) the curve below centre is kept linear, only the main section is made variable.

- The calibration curve reference number (–15 to +15) is displayed on the slope selection dialogue so that the same slopes can be more easily applied to a group of like axes (such as the four separate throttles).

- The "Roger Wilco" (also AVC and SB) PTT control, assignable in the Keys and Buttons drop-downs, operates both locally and via WideFS without necessitating any use of the "KeySend" facilities nor, if the latest WideFS is used (6.50 or later), any parameter changes in the WideClient INI files. The PTT requests are broadcast to all Clients.

- Support for Squawkbox 3's private (PVT) message PTT is added for assignment in both the Keys and Buttons controls drop-downs. This also is automatically applied to all WideFS clients. [NOTE: this needs SB version 3.0.4 or later].

- An error which caused CFS2 to crash when the FSUIPC options were opened is fixed.

- Problems registering FSUIPC with long user names or email addresses are fixed by enabling the entry fields to scroll if necessary. The limit is 127 characters for each.

- An error preventing the co-pilot axis assignments from taking effect is fixed.

- Errors in the helicopter-specific engine data at offsets 08F0 to 08F8 are fixed.

- Additional data now provided through the IPC interface includes:

32F8	bits 4-7 can be used to prevent reversers activating (e.g. simulating a hydraulics failure).
32F9	(one byte) is set non-zero when the brakes are used. This could be accessed to determine when to automatically disengage auto-brakes, for instance.
0C4D	VOR1 type code
0C70	VOR2 type code

The bits in these two single byte values are used as follows (bit 0 = 2^0):

0	DME available
1	TACAN
2	Voice available
3	No signal available
4	DME transmitter at GS transmitter
5	No back course
6	GS available
7	This is a localiser (else it's a VOR)

0C52	VOR1 signal strength
0C62	VOR2 signal strength

These are both 32-bit integers, units unknown.

089A	Secondary throttle 1 control
0932	Secondary throttle 2 control
09CA	Secondary throttle 3 control
0A62	Secondary throttle 4 control

These are the same as the main throttle controls (at 088C, 0924, 09BC and 0A54) except that they are switchable via offset 310A/310B just like joystick inputs, and have their values readable (even when disconnected) at 3330–3336, like the separate axis controls do.

- The NWI (New Weather Interface) reading system is changed so that the CCxx offsets are always populated with weather. Before any reads are performed, or after an illegal request (e.g. ICAO is not a Wx station), the weather here will be that at the aircraft position, and the Lat/Lon values will reflect this. After a legal request, the resulting weather continues to be updated every second even after the signature times out—previously this update would cease after a few seconds.

  Note that this change means that the timestamp in CC24 is always being updated at one second intervals. If programs want to check that the weather provided genuinely is for the location they requested, they should read the ICAO and/or Lat/Lon back within the same Process call as reading the weather data itself, and check that they are as requested.

Version 3.48 (April 2005) includes these fixes and enhancements:

- Fixed a serious bug in the Buttons processing, which could make buttons programmed for aircraft specific actions as well as general actions both activate when pressed.

- Fixed another bug in Buttons, where changing programming between Key and Control actions, or vice versa, in the FSUIPC options could create duplicate actions in the INI file.

- FSUIPC now retains comments at the end of Button program lines, provided they begin with a semicolon (;). There's a limit of 63 characters on the comment itself.

- Comment lines can be included in the [Buttons] sections, provided they are numbered just like true parameter lines. This determines their position, which is then retained. The comment begins with a semicolon (;), so the format is n=;...

- The "Extend METAR Max" option for visibility is changed in FS2004 to set a minimum of 10.1 miles for both metric (9999) and imperial (10SM) visibility specifications. This is in order to get the visibility past the FS2004 threshold for "grey skies" which appears to be 10sm. In FS2002 and before it was around 4sm, so it wasn't a problem in this respect.

- An option to exclude calibration of the old THROTTLEn_SET controls is now provided on the 4 throttles calibration page. This ensures that FSUIPC leaves those controls alone and only operates on the newer AXIS_THROTTLEn_SET controls. Users of the add-on ERJ-145 aircraft will find that this allows the full FSUIPC calibration on separate throttles to be used with no problems.

- A new joysticks options page has been added for up to 4 separate reverser axes. by default these are all assigned to the equivalent separate Mixture axes, which can be assigned in FS's own dialogues. An option is provided to activate these reverser actions for Jets only.

- The TCAS_DATA2 structure now contains additional data. The "spare1" field is now "short sPitch", containing the aircraft pitch in degrees * 65536 / 360, and the "spare2" field is now "short sBank;", containing the aircraft bank in degrees * 65536 / 360. Unlike the rest of TCAS_DATA2, these fields are valid in FS2002 as well as FS2004.

- Comprehensive facilities are provided to allow applications control over the AI aircraft TCAS data options. Details are provided in the latest revised Programmer's Guide. (New SDK 25th release is available).

Version 3.47 is a major release (maybe it should have been 3.50), and includes:

- For FS2004 only, this version includes a new facility on the Winds page to select a different way for the "taxi wind" option to operate. Instead of simply reducing the speed to 1 knot, it eliminates or reduces the cross-wind only, and does this proportionally to the ground speed (over 20 knots) and aircraft gross weight.

  This is selected by a new checkbox. It can be switched on and off in the same way as the 1 knot taxi wind, and in automatic mode it operates within 500 feet of the ground, not just on the ground.

  This facility is recommended as a better alternative to the rather crude 1 knot taxi wind method for those looking for more realism.

- FS time setting via the FSUIPC interface has been made safer in FS2004. In FS versions up till FS2004 the simulator was reacting correctly to direct changes to the Global values for Zulu hours, minutes, day and year. It looked to be working correctly in FS2004 as well, but apparently there were insidious side effects for AI traffic, and these could sometimes cause FS to hang when traffic was reloaded or changed any time later in the session.

  In this version, for FS2004 only, FSUIPC intercepts writes to the time locations and uses them to issue the appropriate commands to FS to change the time. This makes the new time correctly propagate through the AI system (and may trigger a traffic reload), and avoids subsequent otherwise inexplicable hangs.

  Designing this in a way which avoids the problems with AI traffic reloading causing hangs, yet doesn't create too many unwanted pauses for reloading traffic whilst flying, has proved quite a thorny problem. So, I am providing a compromise as the default solution, and also allowing you to select between two other modes should you desire.

  The default is this: any time change of more than one minute, or any change at all to the hour, day or year, results in propagation through FS and will therefore trigger at least an AI traffic reload, maybe more. This mode is "**TimeSetMode=Partial**".

  The options, selectable *only* by editing the FSUIPC.INI file, are:

    TimeSetmode=On: all changes to minutes, hours, day and year are propagated throughout FS. This is how the interim test release FSUIPC 3.465 behaved.

    TimeSetMode=Off: no changes to any of the date/time values are propagated at all. This is how all versions of FSUIPC before 3.465 behaved.

  Also, in order to try to prevent AI Traffic loading hangs when instigated by using the FSUIPC traffic density controls, FSUIPC now propagates the complete Zulu time and date immediately before reloading the traffic if the new density value is higher than the old value.

- The filename (without the path) of the last saved FLT file is now available at offset 0400. This is an ASCII string, terminated by a zero byte, of maximum length 128 bytes inclusive. The count in offset 3BD2 should be used to determine when this has changed.

  Note that this is an alternative to using Command 3 of the path reading facility in offset 0FF0. It may be preferable now that more programs are using that facility, as it avoids queuing whilst waiting to place a command when some other program is there first.

- The elevation, in metres, of the two DMEs are now available for FS2002 and FS2004 in the following offsets:

    DME1 (i.e. the DME tuned by NAV1):   16-bit integer at 088A
    DME2 (i.e. the DME tuned by NAV2):   32-bit integer at 083C

- The engine RPM for the Robinson piston model in FS2004 is now available in two forms, in the N1 offset (0898) as a value which when scaled gives the RPM, and in the N2 offset (0896) as a percentage of the maximum multiplied by 16384. Note that the maximum can be exceeded -- the Robinson model seems to allow up to 110%, which would be represented here by 18022.

- The FS2004 rotor clutch switch (as in the Robinson R22) can now be read and controlled via a single byte offset, 0889. This is 0 for "off" and 1 for "on".

- The "Key press not to be held" checkbox on the Buttons programming page is now correctly checked by default. The option has always been defaulted on, but the checkbox was not correctly initialised.

- A very long-standing error in the application hot key facilities is fixed. This error allowed extended key presses (i.e. those detected following the main hotkey) to be passed through to FS despite the 'pass through' option not being selected by the program

- The button and key programming facilities are improved in the following ways:

  1. FSUIPC now does not re-save the button and key sections of the INI every time they are loaded. This saves time. Furthermore, it now retains the user's own line numbering, making a system of numbering possible to help with complex programming.

  2. The Buttons and Keys option pages now both feature a "Reload" button to force FSUIPC to load the settings from the INI file again. This may be more convenient than changing aircraft when developing and testing. Using this button, the sections are then also re-written to the File, so that anything understood differently by FSUIPC can be spotted directly. If the Reload button is used after making changes in the dialogue, those changes will be lost—changes are not saved until the dialogue is closed by the Ok button.

  3. The syntax of Buttons and Keys lines is now checked more thoroughly, and those in error have an "<< ERROR ..." message attached to them, rather than being deleted. Such error messages are automatically removed on reload after correction. The message contains an error number that will help pin-point the problem. The list of such numbers is provided in the Advanced User's documentation.

  4. Keys and Buttons offset conditionals can now optionally be specified with hexadecimal comparison values (preceded by 'x'). When FSUIPC re-writes the INI file it uses hexadecimal when a mask has been used (masks are always hexadecimal), and decimal when not.

- The Logging page now features an extra logging option, for detailed Button logging. This allows sophisticated button programming to be more easily debugged.

- The "Minimum Weather Defaults" button has been removed and replaced by **Weather Settings Off**. The original button set defaults for all options except for weather, where it set less that the defaults. This change allows users to retain their non-weather related options and simply set minimum weather ones. To get the same effect as before you'd need to first set the normal defaults with the left-hand button, then set weather options off with the right-hand button.

- A bug is fixed that prevented the FS single "Brakes" control being used if Throttle 1 was calibrated in FSUIPC's separate throttles page.

- The "REV" (reverse) setting for individual FSUIPC joystick calibrations is now correctly saved in the INI file and re-established in subsequent sessions.

- An error is fixed in the programmable "flight freeze" facility, controlled by offset 3541. In error, if this was enabled but then stopped early by writing zero, the next time it was enabled it placed the aircraft at the previously frozen position.

- The feedback control for aircraft speed (offset 0730) now optionally operates with Ground Speed as the target instead of Air Speed. This may be useful for controlling taxi speeds. To indicate GS in place of IAS set the 2^3 bit in the flags.

- The feedback control for aircraft banking (offset 0718) now automatically enables FS's auto-coordination (auto-rudder) when operating. The previous setting of this is restored when the banking control is stopped.

- The axis disconnection facilities in offsets 310A and 310B are augmented by the addition of bits for the four separate throttles:

310A bit 6	Throttle 1
310A bit 7	Throttle 2
310B bit 6	Throttle 3
310B bit 7	Throttle 4

- The facility to disconnect throttle axes is now available for programming on buttons or keys via three additional FSUIPC controls:

1065	Throttles off
1066	Throttles on
1067	Throttles toggle

  These may be useful for disconnecting joystick axis throttles which, through jitter, cause sensitive auto-throttle controls to disconnect.

  Note that the setting of the throttle axis disconnects may be overridden by currently running programs using the same facilities. For example, the Project Magenta MCP will re-connect throttles when its auto-throttle is not operating, and vice versa.

- Additional FSUIPC controls are provided in FS2004 (only) for separate engine auto-starts:

1061	Engine 1 Autostart

<pre>
1062   Engine 2 Autostart
1063   Engine 3 Autostart
1064   Engine 4 Autostart
</pre>

These operate in almost exactly the same way as the built-in FS engine autostart, but only on the specific engine.

- The access key checking for gauges now allows a few seconds leeway for accesses from a gauge after it theoretically should have been unloaded during an aircraft change. It seems that the odd one or two gauges take longer to close and disappear from memory. If they do happen to access FSUIPC after a new aircraft has started loading they occasionally triggered the "unaccredited" error.

- User keys issued with built-in expiry dates did not work correctly in FSUIPC versions 3.411–3.452, even if their expiry date had not been reached.

- The automatic access registration for programs is made more flexible by checking for valid keys in both the Version Information (Comments) field and in the FSUIPC.KEY file. The first valid one is now accepted.

- The optional fix for control acceleration now operates in both the old way (intercepting FS controls) and in the way introduced in 3.45 (hooking the control via the official Panels facilities). Hopefully this 'belt and braces' approach will cover all cases.

- A serious bug in the FSUIPC.INI Button and Keys facilities for offset conditionals (introduced in version 3.41) is fixed. This affected any conditional with a mask specified.

- When the same button is programmed in the general [Buttons] section of the INI file and in an aircraft-specific section, the latter programming should supplant all of the former when that aircraft is loaded. Unfortunately, through a bug, this did not apply to the repeats of a program line specifying repetition (R). This is fixed.

- The classification of AI traffic into the airborne or ground TCAS tables was partly in error for AI aircraft in "Landing" state. These were classified as airborne even after touch-down. This is fixed in this release.

- In FS2004 the visibility layer set by programs using the FS98 method of weather control had an upper level of 0 feet instead of the default (prior to version 3.41) of 6000 feet. This has only just been reported and fixed.

- The "Rev" option in the Joystick calibration facilities, to reverse the direction of the axis, was unusable on axes with non-central centres, such as throttles—it creates an incorrect centre and wrong ranges. This error is now fixed.

- A long-standing error causing problems with some of FSUIPC's facilities when it is used in FS98 and FS2000 are fixed. These are quite numerous -- ranging from the Monitoring not working, to the "in menu" freeze flag not being cleared.

Version 3.45 provides these additions and improvements:

- Additional joystick calibration pages have been added to allow the three **Pan** axes (used in virtual cockpit mode) to be calibrated (on page 9), and the main four **Slew** axes (on page 10). Note that to calibrate slew axes you need to enter slew mode *before* calling up the FSUIPC options.

- The **control acceleration fix** option (on the Technical page) now operates differently in FS2004 and should now also cope with XML gauges that send too many controls to FS. Additionally, on FS2004 with this option enabled, the Select controls (normally assigned to main keyboard keys 1–4) now remain usable despite intervening controls. This makes Engine selection and aircraft Exit toggling to work with any over enthusiastic gauges installed. This latter action takes place over a period set by the new INI parameter, **TimeForSelect**, which defaults to 4 seconds.

- Operating independently of the **acceleration fix** option, but still on FS2004 only, special action for pushback direction selection is now incorporated which allows this (SELECT 1 for tail to left, 2 for tail to right) to occur at any time when FS pushback is still in action, despite intervening controls. At last, this allows you to do things like look out of the side windows, or start the engines, during pushback, without losing the selection of left or right turning as part of the same pushback operation.

- For FS2004 only, the logging facilities now include **Event** logging (events here being defined as all FS controls which are not axis types), and, separately, **Axis** logging. Both can be very useful to those seeking to understand the actions of their buttons and keys, or to view the sorts of things some of the more complex panels do, repeatedly, every second.

- Function Keys F13–F23 are now recognised in all parts of FSUIPC which accept key presses, whether for input programming or for output results.

- Whether aircraft shadows are visible or not can be checked and controlled via the 16-bit (2-byte) value at FSUIPC offset 11A4. Setting this to 1 enables shadows, 0 disables them. This applies to FS2002 and FS2004. Thanks are due to Douglas Dawson for this discovery.

- Additional FSUIPC offsets now mapped:

2A48	8 bytes	Double floating point value giving left wind fold (0.0–1.0)
2A50	8 bytes	Double floating point value giving right wind fold (0.0–1.0)
2A70	8 bytes	Double floating point Canopy Open indication.

- A bug which can prevent correct auto-accreditation of external (EXE) programs on Win98 or WinMe is fixed. In previous versions the work-around would be to register the same program manually, via the "Register an application program" button.

Version 3.44 includes these changes:

- Fixed a bug in the recently-added axis Filter option. When filtering is enabled, some of the axis mapping facilities did not work correctly.

- FSUIPC now provides a "freeze flight position" facility. This keeps the aircraft at the same latitude and longitude for as long as it is engaged. The altitude and attitude of the aircraft is free to change, and, in fact, the aircraft flies as normal except for not changing it's position over the ground. This is appearently a very useful facility for training environments.

  The facility can be accessed in several ways:

  (a) For program control, write a non-zero values to the one byte offset 3541. This acts as a timer – the freeze will last for as long as this byte is non-zero. It is used as a time, counting down 1 every timer tick of 55 mSecs or so. To retain the freeze for a good time, write 255 here and do so every 5–10 seconds. Allow for WideFS delays.

  (b) Users can program an FSUIPC or two on a Key or Button, using the Keys or Buttons options. There are three new FSUIPC controls provided:

  > Freeze pos on (1058)
  > Freeze pos off (1059)
  > Freeze pos toggle (1060)

  This facility works with all supported versions of FS, but it only works well in FS2004. In FS2002 and before odd things happen – the aircraft sounds move away, following the original path the aircraft would have taken. Additionally, when the freeze is released, the aircraft jumps to where it would have got to by then. Neither of these things happen in FS2004.

  The operation is smooth, and it applies to slew mode as well, though fast slewing will tend to cause some jerks in the slew direction.

- A new option is provided on the Technical page in FS2004 to require FSUIPC to 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.

  This option is also available on previous versions of FS, but in those cases it cannot be enabled or disabled in the Option screens, but only by changing the "ZeroElevForAPAlt" parameter in the FSUIPC.INI file.

- FS panel GAUge file accesses to FSUIPC are now correctly recognised and registered even when they occur a lot later than the original panel loading. This fixes some occasional problems with complex panels featuring multiple FSUIPC client gauges.

- On FS2004, AI traffic is now generally classified as "on ground" or "airborne" according to its state and not only its "on ground" flag.

- New offsets for VOR2 values are provided. There are now VOR2 equivalents for all of the VOR1/NAV1 values already supplied. Here is the list and equivalents (FS2002 and FS2004 only):

VOR1	085C	Latitude	VOR2	0858
	0864	Longitude		0860
	086C	Elevation		0868
	0870	ILS heading		0844
	0872	ILS glideslope		0846
	0874	LOC latitude		084C
	0878	LOC longitude		0850

087C	LOC elevation	0854
0880	DME Latitude	0834
0884	DME longitude	0838
0C49	GS needle	0C6E
0C4C	GS flag	0C6F

- Modules such as ActiveX .ocx which run inside another process (for instance Internet Explorer or an equivalent) can now gain FSUIPC access accreditation like an EXE file by submitting both the given access Key *and* the full module name to the 8001 offset.

- The IPC read/write logging for local and internal FSUIPC client applications now identifies which of several such programs or modules each read and write is received from. This does not apply to privileged direct access, such as that from WideServer.

- The standby altimeter reading at offset 3544 is now less "jerky". Previously it was derived by differences from the main altimeter reading, but this caused some temporary changes as the latter is adjusted. Now it is computed completely independently.

- Offset 3518 provides the FS-set "Ambient Wind Y" value within about one second of offset 3478 being written by an application, to control up and down drafts. This allows such a program to monitor FS/scenery arranged updrafts and adjust its actions accordingly.

- General improvements have been made in the FSUIPC option screens. Specifically, the "REV" option which was partially visible on the Flaps information section, and the incorrect (FS2002) Flaps increment value shown there—on FS2004 the increment is doubled because the range is from −16383 to +16383, not from 0 to +16383 as it used to be.

- The timeouts for timestamp updating have been eliminated or reduced substantially when the command they relate to originated from an internal DLL or GAUge. This is partly because in these cases there is no need for the delay, but primarily because it appears that there are some such modules already released that assume that there will be an instantaneous implementation of their requests.

- An error in the timing of the timestamp update for runway usage (offset D008) has been fixed.

- The timestamp for Weather setting (at offset C824) is now safeguarded from writing by client applications, which could have led to them fooling themselves into believing the timestamp had changed because the request had been actioned.

Version 3.411 was released very quickly after 3.41 to fix a newly revealed problem. Unfortunately it was discovered, just after release, that the calibration fix was actually incomplete, and unmasks another error which was hidden beforehand. The result is that five axis types are calibrated with a range of -16384 to +32768 (instead of -16384 to +16384).

This means that those axes, when calibrated in FSUIPC, only utilise 2/3rds of their travel! The axes affected are:

On page 1: Throttle (only)
On Page 2: Prop Pitch, Mixture, Left and Right Brakes.

The fix was relatively easy to apply, but it has meant a re-issue.

Version 3.41 (November 2004) contains the following improvements:

- A serious bug in the Joystick Calibrations for non-centering axes is now fixed. This bug would have badly affected FSUIPC's calibration capabilities for axes such as brakes, single throttles, flaps and spoilers. As far as I can tell the bug was introduced with the digital filter option in 3.40.

- Sometimes buttons programmed in FSUIPC for connections on other PCs being read through WideFS were being actioned twice when pressed once. This is fixed.

- The default lower altitude for the graduated visibility option is now set to zero in FS2004. This is, in fact, the most desirable value in FS2004 as it makes FSUIPC start the graduation from the top of the FS visibility layer, no matter where it is set.

- The number of key press combinations that can be programmed is extended by the addition of two more "shift" type keys:

    Win: the 'Windows' key on the nearest key row, one each side (but treated the same), and

    Menu: also known as the "Applications Key", the key with a small menu symbol on it, between the right-hand Windows key and the right-hand Ctrl key.

These can be used in combination with the other shifts (Ctrl, Shift, Tab) already available plus, of course, one of the main keys. In the case of the *Win* key, one of the others *must* be used, and held down first, otherwise the key will bring up the Windows start menu instead. However, the *Menu* can be used, in FS at least, as a free-standing shift key, making combinations like *Menu+A* and so on very usable.

These new "shifts" can be used wherever FSUIPC supports key programming, whether as hot keys for FSUIPC, hot keys for applications (using new bits in the IPC interface), or as part of the Key or Button programming (both input and output).

- New FSUIPC controls for in-use radio frequencies are added to the list available in the Buttons and Keys programming drop downs for the following functions:

1030	Com1 use whole inc	1044	Nav2 use frac inc
1031	Com1 use whole dec	1045	Nav2 use frac dec
1032	Com1 use frac inc	1046	Adf1 use whole inc
1033	Com1 use frac dec	1047	Adf1 use whole dec
1034	Com2 use whole inc	1048	Adf1 use frac inc
1035	Com2 use whole dec	1049	Adf1 use frac dec
1036	Com2 use frac inc	1050	Adf2 use whole inc
1037	Com2 use frac dec	1051	Adf2 use whole dec
1038	Nav1 use whole inc	1052	Adf2 use frac inc
1039	Nav1 use whole dec	1053	Adf2 use frac dec
1040	Nav1 use frac inc	1054	Xpndr low NN dec
1041	Nav1 use frac dec	1055	Xpndr low NN inc
1042	Nav2 use whole inc	1056	Xpndr high NN dec
1043	Nav2 use whole dec	1057	Xpndr high NN inc

- The IPC offset increment/decrement controls are augmented by four new ones, operating cyclically (i.e. increment at the maximum cycles to zero, decrement at zero cycles to the maximum). These are useful when only one button is available to select between a small number of choices. Full details are included in the Advanced User's Guide.

- Button and Key programming can now be taken to a new level of sophistication by having actions conditional upon FSUIPC offset values. This can only be done by editing the FSUIPC.INI file, and the FSUIPC Programmer's Guide (from the SDK) is needed as reference for the offset usage, but the flexibility of the approach makes many things possible. Full details, along with some simple examples, are provided in the revised Advanced User's Guide.

- To allow good use of the conditional facilities in Key programming, the maximum number of Key parameters that can be processed at any one time is increased from 256 to 1024.

- Bad wind values that are overridden by limits from the Winds option page are now only logged when Weather logging is enabled.

- The Flight loading and saving operations activated through IPC offset 3F00 are now not actually actioned in-line during the IPC call from the application, but are dealt with via the standard FS messaging system. This avoids timeouts over the IPC interface which, by default in the library code provided, may result in fatal retries.

- Time-stamped data read operations (those for FS paths or filenames, runways in use, and weather at a location) are now made more reliable, especially when used over WideFS links, by delaying the timestamp update for a short time (100–300 mSecs depending on which operation). For best use of this the latest WideFS should also be installed (6.41).

- Write requests to the IPC interface are now discarded if the offset specified is less than 0x0010 or the size of the request is greater than decimal 8192. This is to avoid crashing FS through slightly misbehaving applications.

- Occasionally the second running instance of the same program was not correctly accredited with an unregistered FSUIPC even though the access key was correct. This only happens with programs providing this key via the "Comments" field in the Version information, and is now fixed.

- Carb temperature values are now accessible, in degrees Rankine (double floating point format) in offsets 3828 (engine 1), 3768 (engine 2), 36A8 (engine 3) and 35E8 (engine 4).

- The user aircraft's "ATC Model" name is available, as a string of up to 24 characters including a terminating zero, at offset 3500.

Version 3.40 (October 2004) has many little improvements and new facilities, and it should work fine with the forthcoming FS2004 update announced by Microsoft—if not, a revision will soon follow. The new facilities, improvements and corrections incorporated are:

- A simple digital filter option is now provided for all Joystick axes calibrated through FSUIPC. This attenuates changes faster than around 2Hz and should help reduce or even (hopefully) eliminate unwanted jitter. The filter is either on or off (via a checkbox), no adjustment currently being provided.

- The Joysticks section now includes the option to map a single Mixture control to the 4 separate mixture controls, thus providing the ability to calibrate for a 'central' idle position with a minimum or cut-off range below.

- All axes in the Joysticks section now include a checkbox to reverse the direction in which the control operates. This reversal is done *after* the calibration is applied, so the numbers shown still increase left-to-right, but you will see the effect on the OUTPUT value.

- The default assignment of the FSUIPC Reverser axis to the FS Mixture control is extended to cover both old and new FS mixture controls—apparently the GoFlight throttle quadrant, for instance, uses the older control (MIXTURE_SET) not the more recent AXIS_MIXTURE_SET.

- The TCAS data selection option in the FSUIPC Technical options page now also allows the aircraft identification string to be its 'Model' name.

- A facility to make FSUIPC perform one-off actions when FS is first loaded and running (ready to fly) has been provided. This is by programming a real or imaginary Button. Adding the line "InitialButton=j,b" to the [Buttons] section on FSUIPC.INI does the trick. The values of j (0–255) and b (0–31) can specify a real joystick and button, or a non-existent one, it doesn't matter. Real ones can have an action assigned on-line, in the Buttons option page, but multiple actions for any button, real or not, can be accomplished in the INI file as usual.

- The [Buttons] and [Keys] sections of the FSUIPC.INI file are now re-processed completely whenever the user loads a new aircraft. This allows those programming such things in the INI file (rather than in the FSUIPC option screens) to make changes and then try them out without having to re-load FS. With most text editors it is even possible to keep the INI file open whilst testing.

- FSUIPC-added controls as well as FS controls can now be used by application programs, via offset 3110, with the exception of the Offset ones (for which, of course, there is no need). The relevant control numbers are as listed in the FSUIPC Advanced Users' document.

- New FSUIPC offsets are provided to support a standby altimeter, where the barometric pressure setting can be different from the built-in FS setting. These offsets are 3542 for the pressure setting (the input) and 3544 for the resulting altimeter reading (the resulting output, maintained). These offsets are directly equivalent to the offsets 0330 and 3324 for the primary altimeter.

- For FS2004 only, the full frequency range 100.0 to 1799.9 can be applied to ADF1 via FSUIPC offsets. Prior to this the more restricted range applicable to FS2002 and before was applied (200.0 to 1699.9).

- Module and gauge access registrations via offset 8001 now always result in an "ok" or "invalid" Log message, identifying the Module or Gauge concerned. This is only done when the data at 8001 is changed, so repeated attempts don't fill the disk too fast! The messages occur even with a fully user-registered installation of FSUIPC, making testing a bit easier for Module and gauge programmers.

- A new method of interfacing Modules and gauges to FSUIPC has been implemented which is faster for FSUIPC when checking permissions, and also works from any thread in a multi-threaded gauge or Module. The programmer is still responsible for protecting the data areas used, via suitable interlocks. The new system is used automatically when gauges and Modules are compiled with a new version of the ModuleUser library (or its source code), available in an imminent SDK update, but be warned—once so compiled, the module or gauge will not work with versions of FSUIPC earlier than 3.328.

- The button 'repeat' option didn't work for buttons connected via WideFS. This is fixed.

- The button 'PollInterval', defaulting to 25 mSecs, seems to create assorted problems at that rate in operating systems other than Windows XP. To counter these problems, the default rate is now 50 mSecs on any operating system other than XP.

- The option to allow a joystick elevator trim axis to be automatically disconnected when the FS autopilot is enabled in a vertical control mode is now working properly.

- The weather options control mechanism (via offset 3127) is now working correctly.

- An error giving rise to spurious NW_SET override messages in the FSUIPC Log is fixed.

- The .FLT (flight) path reading facility at offsets 0FF0/1000 now works correctly with non-English versions of FS2004.

- Users of my PFC.DLL driver lost elevator trim axis control when the PFC option for suppressing throttle interference from regular joysticks was enabled. This mostly did no harm at all, except when using aircraft such

as some of the PSS Airbus series where the autopilot controls vertical pitch solely using the trim axis. This is fixed in this version of FSUIPC.

- Assorted problems when running FSUIPC 3.xxx in CFS2 are fixed. These were introduced some time back. FSUIPC now seems to work fine with CFS2.

- The FS2004-only facility to set and refresh the Ambient Wind Y (i.e. vertical) value at offset 3478 has been made to work reliably and without odd intermittent lapses when the prevailing value took over.

- The FS2004-only facility to directly set the ambient wind via offsets 2DE0 and 2DE8 now works much more reliably and smoothly.

- The FSUIPC offset controlling the Engine 1 Anti-Ice (offset 08B2) in error switched all 4 engine anti-ice controls in FS2004 (only). This is fixed.

- In FS2002 and before, data areas were available for all 4 engines even for single or even no-engined aircraft. All that happened was that the values were left 'frozen'. Reading and writing values for a non-existent engine did no harm. In FS2004 this has changed. It appears that the data structures are allocated with a specific size to support the correct number of engines. Reading beyond the available structure may or may not cause a crash, writing beyond may cause a crash, but worse, it may cause other unpredictable things to happen depending upon what data happens to follow. To fix this, FSUIPC now ignores reads and writes to specific engine-related areas if the relevant engine doesn't exist.

- The timestamping system used to validate some requests made to FSUIPC through the IPC interface has been improved in several ways, including guaranteeing that the timestamp does change once and once only when the associated data changes.

- A facility to read complete identifying names for AI aircraft has been added in the IPC interface. This is another use of the area at offset D000 previously only used for detecting runways in use. Five commands are available, to read the tail number, the airline + flight number, the ATC type and (as a separated string) the model, the full aircraft title, and the ATC type with the 3 last digits of the tail number. Full details are published in a revised SDK, which is imminent.

- The drop-down lists of FS controls in the Keys and Buttons pages of the FSUIPC options could display the wrong control when the FS 'CONTROLS.DLL' includes duplicate entries in its tables. This appears to be the case in FS2004 with the control "Add Fuel Qty", making all following controls (numerically, not by name) go one out. In the fixed version, FSUIPC deals with the duplicates properly.

- FSUIPC offset 32F8 (one byte at present) provides options to inhibit certain aircraft operations, for use in breakdown or precise control implementations. Currently the following are available:

  2^0 Set to inhibit flap operation
  2^1 Set to inhibit spoiler operation
  2^2 Set to inhibit gear operation

These stop operation from axis and button controls very well, and also from key presses and mouse clicks—but in these latter two cases it is done by detecting a change in the system and changing it back. This works, but the device will sometimes try to move, and this can be noticeable, especially for some reason with the flaps—the indicator gives a little jump and the noise briefly starts.

Version 3.30 (July 2004) is a major release with many changes, both large and small. Here's a summary:

- The Wind facilities are now extended on FS2004 to allow proper wind smoothing, taxi winds and surface wind limiting to be applied in the weather actually simulated at the aircraft, no matter where the weather originates. Facilities are included to delay the smoothing for a specified number of seconds after all weather is cleared, and to stop the smoothing altogether when the aircraft is not airborne.

- The joystick calibration facilities have been extended in the cases of aileron, elevator and rudder to allow one of a selection of response curves to be applied. These allow the response to be slower (less sensitive) near the centre and faster (more sensitive) near the extremes.

- The facilities for setting bits and values in FSUIPC offsets, via special FSUIPC controls, is extended to provide incrementing and decrementing by any values with defined limits. "Offset" controls for both unsigned (U) and Signed (S) Byte and Word increment and decrement are now included in the available Offset controls for both Key and Button programming. This is fully documented in the Advanced User's guide.

- A problem with the Traffic controls added for Button and Key programming, which in particular could cause FS to crash when used to re-instate a higher level of AI traffic, is now fixed.

- The button repeat timing is now more properly regulated. It was sometimes far too fast in recent releases, due mainly to the increased button polling rates being used by default. The repeat rate used can be set by a

"ButtonRepeat" parameter in the main [Buttons] section of the INI file, with a range of 1–100, with 0 meaning no restriction. The default of 20.

- A new parameter, "PollEpicButtons=No", can be added to the main [Buttons] section of the INI file if FSUIPC's polling of EPIC buttons is causing problems. This really only applied to ISA EPIC users still using my old VXD under Windows 95/98/Me.

- Rudimentary aircraft autopilot feedback control facilities are included in FSUIPC. Pitch and bank control are both working reasonably well, but the speed and mach control really needs more work. This facility is operated through new offsets and will be documented in the FSUIPC SDK in due course.

- Some serious omissions are fixed for FS2000 users, Anti-Ice switch control via the IPC interface being the main one.

- An error in the FSUIPC-added "Offset" controls (for writing directly to FSUIPC offsets) is fixed. Previously the length of the data could often be in error, with, for instance, 4 bytes being written instead of 1 or 2 for the "Byte" and "word" variants.

- A bug in the AutoTuneADF facility (an Advanced User option in the INI file) is fixed.

- The processing of PFC buttons and switches is made more reliable, in conjunction with parallel improvements in PFC.DLL (PFC driver 1.859 or later is required for this improvement to be noticed).

- The New Weather Interface is more protective of the data it receives for NW_SET and NW_SET_PENDNG commands. If a program ignores or defies the timestamp-change protocol and writes the next weather too soon, the previous setting is completely discarded now and the new one properly obeyed.

- For FS2004 only, the Ambient Wind Y (i.e. vertical) value at offset 3478 can now be written to and FSUIPC will sustain the value written for up to 14 seconds or the next written value. This facility may be useful to generate up and down drafts, e.g. for gliders or for turbulence. The value is not subject to any FSUIPC limitations or smoothing.

- For FS2004 only, the following new offsets can be written to directly affect the wind and visibility at the aircraft. These values are set *before* FSUIPC performs any smoothing or limiting actions, and effectively become the new target values. FSUIPC sustains these as targets for a maximum of 14 seconds, with the next write to the same location restarting this timeout. After the timeout has been allowed to expire the intended FS value will take over, with smoothing and so on if enabled.

2DE0	8	Wind direction in degrees, 64-bit double floating point
2DE8	8	Wind speed in knots, 64-bit double floating point
2DF0	8	Visibility in metres, 64-bit double floating point

Note that weather set in this fashion is *not* reflected in any weather data supplied by the weather system in FS nor FSUIPC. It is acting locally to the aircraft and can be monitored by Shift+Z or the ambient weather read-outs in FSUIPC.

- For FS2004 only, "Aircraft Wind" values can be read at offsets 2DC8 (X, lateral), 2DD0 (Y, vertical) and 2DD8 (Z, longitudinal). These are all relative to the aircraft orientation, and give the wind speeds actually operating on the aircraft in feet per second, all 64-bit doubles. [Note that these will not necessarily be correct if the facility in the previous item is used to 'fiddle' the wind speed].

- A new option in the Technical page is provided to allow a joystick elevator trim axis to be automatically disconnected when the FS autopilot is enabled in a vertical control mode (ALT or GS).

- The facilities at offset 310A for disconnecting aircraft control axes (for use by external or add-in autopilots or fly-by-wire) are extended to allow the Elevator Trim axis to be disconnected as well. If the user option described in the previous entry is enabled, this is done automatically when the elevator axis is disconnected.

The original, post-calibrated, value for the trim axis input is supplied for reading at offset 3338.

- A 16-bit count of FLT files saved is now provided at offset 3BD2. The path reading facilities at offsets 0FF0 and following are extended with a command of 3 to read the last saved Flight filename (without any path or filetype). This works on FS2000, FS2002 and FS2004. The details are also logged.

- Where timestamps are used in the IPC interface in order to indicate when requests have been fulfilled, the timestamp is now automatically changed again after about 100 mSecs. This is to make sure that programs running on WideFS clients see these, even if this is the first time they are reading the offset. The possibility previously existed of the first such update being missed because of the default WideClient action of waiting for data the first time it is requested.

- The FS2004 horizon bar position on the AI can now be read via offset 3548. This is a 64-bit floating point value, as a percentage of the maximum (usually 10%), with positive being up and negative down.

- Bit 2^2 in offset 330C is now set when the FSUIPC installation is fully user registered.

- A bug in the Menu limiting facilities is fixed. Previously, when an application program attempted to prevent access to the aircraft menu, for instance, the World menu was also disabled. The same applied to some other individual selections.

- The "in menu/dialogue" flags in offset 3365 were not always maintained correctly when FS has re-entered the initial flight selection menu (i.e. ESCape then Exit Flight). This was because, oddly, FS continues to send the frame calls that FSUIPC uses to detect activity, albeit less frequently. The 2^2 flag in 3365 would toggle on and off for the duration, as FSUIPC kept changing its mind as to whether FS was flyable or not. This problem has been dealt with by delaying the clearing of either of the flags in 3365 for one second after they are set.

Version 3.22 (May 2004) is a consolidation and fixes release, with a few technical additions that may be useful to engineers. Here's the list:

- Problems getting the Project Magenta controls "by parameter" working correctly are resolved. Additional logging for button actions is also incorporated to assist in any future additions in this area.

- Now that Project Magenta components process controls themselves where applicable, without the need always for the MCP to be running, the list of PM controls is not restricted when there's no MCP running.

- A problem in button processing could sometimes cause FS to crash. This was due to certain things being done in another thread, and was very timing dependent. The most affected controls were the traffic density ones added by FSUIPC. The work-around was to add the line "PollInterval=66" to the main [Buttons] section of FSUIPC.INI to prevent FSUIPC using the thread. This is no longer needed and should be removed for most effective button control.

- A bug in the Cloud options page for FS2004 caused the checkbox for random cloud icing to appear unchecked even when the option was enabled. This is fixed.

- The manual registration of Gauges and DLL modules did not work when the filename contained multiple points (full stops, i.e. '.'). The entry in the options page would be truncated to the first such character. This is fixed.

- A general tidy-up of the logging of registration problems with gauges and modules has been included in this version. It should be a lot clearer to see exactly what is wrong when using an unregistered copy of FSUIPC.

- On FS2004, FSUIPC now detects changes made, through the IPC interface, to the Zulu hour at offset 023B, and submits the appropriate broadcast through the FS chain system so that all parts of FS are aware of this. Previously such a change could get FS into an odd state which would reduce the frame rate considerably thereafter.

- Additional offsets are supported for a variety of technical things, as follows (all applicable at least to FS2004, some will also be correct in FS2002. Full details will appear in an SDK update):

08F4	4	Torque percent value is now correctly mapped for helos in FS2004
08F8	4	Fuel pressure is now correctly mapped for helos in FS2004
08FC	2?	Electrical load on helos (FS2004). *Possibly*.
28C0	8	Ambient density (double)
28C8	8	Ambient pressure lbs/sqft (double)
28D0	8	Static air temperature F (double)
28D8	8	Static air temperature R (double)
28E0	8	Standard temperature ratio (double)
28E8	8	Standard pressure ratio (double)
28F0	8	Standard density ratio (double)
337C	1	Prop anti-ice switch (BYTE boolean)*
337D	1	Structural anti-ice switch (BYTE boolean)*
3470	8	Ambient wind X (double)
3478	8	Ambient wind Y (double)
3480	8	Ambient wind Z (double)
3488	8	Ambient wind velocity (double)
3490	8	Ambient wind direction (double)
3498	8	Ambient pressure (double)
34A0	8	Sea level pressure: QNH (double)
34A8	8	Ambient temperature (double)
3590	4	Engine 1 fuel valve (BOOL)

3594	4	Engine 2 fuel valve (BOOL)
3598	4	Engine 3 fuel valve (BOOL)
359C	4	Engine 4 fuel valve (BOOL)
35A0	8	Airspeed mach (double)

* The two anti-ice switches operate the FS controls for these, and reflect the values of them as read from the gauge token variables. However, they do not appear to operate correctly in any default aircraft. Possibly they are not fully implemented in FS yet.

Version 3.212 (April 2004) was released a few days after 3.21 to correct a problem with the joystick calibration facilities, where maximum and centre calibrations could get mixed up between axes and each other in some circumstances. Additional improvements were made to the timings of joystick button scans, to make them rather more consistently responsive.

Other, minor, changes are:

- The byte at offset 3366 reflects the FS2004 "Engine on Fire" flags. I'm not sure if FS actually simulates such events, but it appears to have allocated Gauge-accessible variables to indicate them. This byte uses bits 2^0–2^3 as flags for fires in Engines 1 to 4, respectively.

- The byte at offset 3367 shows doors that are open (FS2004 only). At present this only provides bit 2^0 for the main doors. If I ever find other flags I'll add them too.

Version 3.21 (April 2004) includes a mixture of fixes and small additions and improvements. Not a major release, but important nonetheless:

- Fixed a problem with GoFlight rotary dual-speed operation if the GoFlight configuration includes a GF-TQ6 throttle quadrant module.

- Fixed a problem with aircraft-specific Buttons and Keys programming, where a change of aircraft was not being recognised in FS2002 at all, or in FS2004 if there was no change of AIR file.

- Fixed a long-standing error where pulsed ("P") and held ("H") keystrokes, programmed in Buttons, were mixed up and sometimes operating incorrectly.

- The programming of some Project Magenta controls (especially the GC controls defined by parameter) is made more reliable by different timeouts and more ruthless error correction, catering for PM components which may not always clear the indications as per protocol.

- Added joystick facilities for analogue cowl flap adjustment. This is via a new Joysticks page, allowing up to four separate control axes to be calibrated, and one or two axes mapped to control 2–4 flaps. Since FS doesn't supply axis controls for the cowl flaps, the user needs to assign otherwise unused FS axis controls and tell FSUIPC which these are by editing parameters in the INI file.

- The aircraft-specific Keys and Buttons programming can now be applied to groups of aircraft (for instance, multiple paints of the same model). This is done by allowing an aircraft name to match a shorter version of the name. This involves editing the FSUIPC.INI file to shorten the name in the section titles created there, and, to prevent confusion for existing users, the whole option is disabled until a parameter in the [General] section ("**ShortAircraftNameOk**") is changed to "Yes". Further, the name of the active aircraft section is displayed in the options title bar when the Keys or Buttons pages are open with the aircraft-specific option selected.

- Additional FSUIPC controls are added for programming in the Keys and Buttons pages, for default FS autopilot values. These are:
    Ap Alt Var Dec Fast (−1000)
    Ap Alt Var Inc Fast (+1000)
    Ap Mach Var Dec Fast (−.10)
    Ap Mach Var Inc Fast (+.10)
    Ap Spd Var Dec Fast (−10)
    Ap Spd Var Inc Fast (+10)
    Ap Vs Var Dec Fast (−1000)
    Ap Vs Var Inc Fast (+1000)
    Heading Bug Dec Fast (−10)
    Heading Bug Inc Fast (+10)
    Vor1 Obi Dec Fast (−10)
    Vor1 Obi Inc Fast (+10)
    Vor2 Obi Dec Fast (−10)
    Vor2 Obi Inc Fast (+10)

- Additional Project Magenta controls are provided, each taking a parameter which is forwarded to PM:

PM Whazzup keys (by Param), see Pm offsets list, 542E
PM Quickmap keys (by Param), see Pm offsets list, 542C
PM GC keys (by Param), see Pm offsets list, 542A
PM CDU keys (by Param), see Pm offsets list, 5428
PM MCP Kcodes (by Param), see Pm offsets list, 04F2

- The PM MCP Flight Director controls are now changed (in PM) to operate the left FD (i.e. the Captain's). This is denoted by naming the FD "**FD1**" in the controls list. Two new controls, for **FD2 on** and **FD2 off** control the First Officer's FD.

- A small change is made to the way FSUIPC sets gustless wind layers on behalf of external programs. Before it set the gust value equal to the wind speed, as appeared normal FS practice. In this version the gust speed is set to zero instead. Whether this actually helps at all is uncertain, but it certainly doesn't appear to do any harm and matches FS's own downloads better.

- Flags are provided via IPC to indicate whether FSUIPC is handling toe brake operation or not (i.e. whether the user has "Set" toe brake operation in the Joystick options). This is via two one byte values at offsets 336E (left) and 336F (right). These will be non-zero if the relevant toe brake axis is "set", zero if "reset".

- A counter of FSUIPC-detected frame rate calls is maintained as a 16-bit value (wrapping at 65535 back to 0) at offset 336C (2 bytes). This might be used, for instance, to try to synchronise an external program more precisely to FS's actual operating speed. [*Note that this is not guaranteed to be accurately synchronised with every FS frame on every version of FS, but it seems pretty good with FS2004*].

Version 3.202 (March 2004) is another minor release with only two changes:

- A bug in the Button programming for PFC devices is fixed. PFC buttons programmed without being "aircraft specific" failed to override the pre-programmed action for the same buttons in the PFC driver.

- A flag is provided in the byte at offset 3365 which indicates when FS is effectively frozen because of menu access or modal dialogue action. Full details can be provided to those who need to use this before the next SDK update.

Version 3.201 (February 2004) fixes a problem with the Keys page in the options—it was previously possible to hang FS by deleting the last Key assignment left in a section (global or aircraft specific). It also makes it impossible to program an action for releasing a key without first selecting an action for pressing it.

Finally, the FSUIPC proportional toe brakes are now proportionally effective on pressure release, as well as application. It seems that, ever since the braking facilities were added several years ago, FSUIPC has always held the highest pressure attained during application until the brakes are fully released, and then it lets them off over a second or two.

Version 3.20 (February 2004) is a relatively major release, hence the jump in version numbers. These are the changes:

- Buttons and dials on GoFlight equipment can be programmed in the FSUIPC Buttons page. Rotary dials have four effective buttons (fast and slow in either direction), toggles and buttons are a single button each. This facility requires a library module (GFDev.dll, *not* an FS module!), which is automatically installed by the latest GoFlight driver package.

- Support is added for programming buttons connected to a separate PC on a Network and supplied by the latest version of WideFS (6.22 or later). This includes normal Windows joystick buttons, EPIC buttons and GoFlight buttons (with the GFDev.dll module installed on the Client too).

- Buttons and Keys can now be programmed differently for each aircraft, with default global actions for aircraft not so selected.

- Up to 2048 button actions are now handled (up from 512), this including the total of the global programmed buttons and the largest aircraft-specific list.

- Conditional button programming (in the FSUIPC.INI file only) now allows up to 16 conditions per entry, up from 2 in previous versions.

- New controls in the Keys and Buttons pages can be assigned to control FS2004 AI Traffic labels—turn them on or off or change the data being displayed.

- Those Project Magenta controls not usable without the PM MCP or FCU program running are now not listed in the Keys and Buttons drop-downs if the MCP or FCU program is not running at the time.

- Offset 3324 (altimeter reading) is now updated at the FS frame rate. Previously it was only updated twice per second.

- A more sophisticated method for identifying calling modules has been incorporated, one which is hopefully foolproof, so there should be no more module or gauge registration problems.

- The BGL user variables 2–5 (offsets 0DD8–0DDE) are now working correctly in FS2004.

- A serious bug in the Keys programming facility in version 3.14 (only) is fixed. This inserted an extra unwanted comma (,) into the INI file entries for every defined Key, and this in turn wrecked the programming next time FS was loaded. Worse, the errors compounded themselves if you then edited the Keys again … and so on.

Version 3.14 (January 2004) includes these new facilities:

- A maximum icing value can be applied to clouds set by third party weather programs. This defaults to 3 to prevent severe icing, even in unregistered FSUIPC installations. This option is only applicable to FS2004 and is introduced to help deal with the more extreme effects of icing in that FS version.

- There are additional FSUIPC controls in the Keys and Buttons pages, allowing any FSUIPC offset to be written or changed by key or button press (these controls all begin "Offset ..."). Byte (8 bit), word (16 bit) and double word (32 bit) values can be written, and specific bits can be set, cleared or toggled.

- A program option is provided for a number of the user options on the Technical page to be inhibited by program (see offset 32F6).

- Facilities are added for programs to obtain the default path for FS FLT+WX files, and the pathnames for the traffic BGLs containing the routings for specific AI aircraft. See offset 0FF0 onwards and the new section in the text preceding the table in the revised Programmers' Guide (part of the latest FSUIPC SDK concurrently released).

Version 3.135 (December 2003) was another relatively minor update, to clear a few things up by the end of the Year. There were the changes:

- In FS2004, the A.I. traffic files being used are logged on first access, along with their file number. This is to help resolve any traffic conflicts with the increasing traffic add-ons.

- The radio navaid status at offset 3300 now includes a bit to indicate whether NAV2 is an ILS or not.

- The wind transition option control bit (2^3) in offset 04DE/F now operates the wind smoothing option in FS2004 (where wind transitions aren't implemented). If enabled this way on an unregistered copy of FSUIPC the default smoothing rate of 5 knots/degrees per second will be applied to global wind changes.

- An FS2004 facility is added to allow applications to request departure and arrival runway information for a specific airport, this being derived from in-range AI traffic allocations.

- The graduated visibility and visibility maxima are now applied on FS2000 and FS2002 even if the FS-specified visibility exceeds the upper altitude visibility by a good margin. Apparently recent FS "real weather" downloads for FS2002 have included many visibility specifications in the hundreds of miles (many at 150 miles, but some as high as 500–600 miles!). These values previously made a bit of a mess of the way the FSUIPC visibility limits and graduation values are applied.

Version 3.129 (December 2003) was released quickly after 3.128 to fix a problem caused by an extra safety precaution built into that version. It delays connecting to most parts of FS until the latter is fully ready to fly. However, unfortunately this check was placed incorrectly, and this in turn made FSUIPC return zeroes to some legitimate requests made by DLLs or Gauges which managed to connect to FSUIPC before FS is fully ready. This caused problems with complex aircraft and add-ins that initialised when FS is started rather than which are loaded later.

Version 3.128 (December 2003) is a relatively minor release, with one important correction and a few small additions, mainly requested by programmers:

- Potential programs with accredited DLL access to an unregistered installation are fixed. The recent re-compilation with a newer Microsoft compiler introduced some additional optimisations that defeated some of the identification checks being made. The problem would most likely have been noticed by a spate of illegal accesses being logged after any aircraft or flight change.

- On FS2004, if FSUIPC sees the spoilers change from any non-parked position to parked, it now automatically clears the "armed" flag. Apparently this little FS2004 bug can otherwise cause problems.

- Again on FS2004 only, some BGL scenery variables (those addressed in BGLs by 312 to 31A) are relocated from G3D.DLL to the GLOBALS.DLL, to the offsets in which they resided in at least FS2002 and probably long before (0DD6 onwards). In case this causes any problems, which seems unlikely, it can be prevented by changing the INI parameter "MoveBGLvariables" to 'No'.

- A single byte at offset 330E counts the number of (apparently) new attempts to connect to FSUIPC by an external application (on the same PC). Once this count reaches 255 it stays there.

- The autofeather arming switch at offset 2E88 now operates correctly on FS2002 and FS2004.

- The erstwhile Roger Wilco "push to talk" controls added by FSUIPC have been re-named just as PTT controls, as they are now also applicable to recent releases of Advanced Voice Client (AVC).

Version 3.125 (November 2003) was issued a few days after 3.12 to fix a timing issue that affected accredited third party Gauges which use FSUIPC in unregistered mode.

Version 3.12 (November 2003) adds the following to FSUIPC:

- Four new controls have been added to the FSUIPC Keys and Buttons drop-down lists:

   Traffic density set: which sets the AI traffic density to the value provided in the parameter field, from 0 to 100 percent.

   Traffic density toggle: which alternately sets zero AI traffic and the percentage set in the parameter field, except if that is omitted or set zero then 100% is assumed. When first used, if the AI traffic is currently off this control sets it on with the density specified (or 100%). If the AI traffic is enabled when it is used, it toggles it off.

   Spoiler inc: raises the spoilers (or speed brakes) by one increment – by default $1/32^{nd}$ of the full extent, or 512 FS units in the range 0–16283. The actual unit can be changed by editing the *SpoilerIncrement* parameter in the INI file.

   Spoiler dec: similarly lowers the spolers by one increment. See above.

- An option is provided (on the Technical page) to make the Throttle Sync hot key apply also to Propeller Pitch and Mixture values, when these are applicable (i.e. not for jets or helicopters). This is best used when you have multiple axis inputs for these, calibrated through FSUIPC. It operates by copying the engine 1 values to the others.

- The TCAS table data provided for FS2004 AI aircraft is extended by additional tables in the offset range D000–DFFF. The additional information includes departure and arrival airport ICAO codes, runways assigned, and traffic file and file entry ID numbers. This only applies to FS2004 AI traffic. Full information will be included in the next SDK update, but programmers needing this earlier should apply to Pete Dowson.

- TrafficLook version 1.52, supplied with this FSUIPC release, is enhanced in several ways:

   Additional columns have been added to show the departure and arrival airport ICAO codes and the assigned runways (when applicable), on FS2004 only.

   All columns are sizeable, and moveable, and the list can be sorted on any of them. The settings are retained, separately for Airborne and Ground aircraft, in an INI file. It is easy to configure it to display the most important information in a thinner window and have the two side-by-side on one screen. An example INI is provided for such a layout, suiting a screen of at least 1280 x 1024 resolution.

   The print-out now follows the arrangement (but not sizing) of the screen columns.

- Facilities are provided in the FSUIPC interface to send FS controls to selected AI aircraft. Many of them appear to do nothing, or at least nothing useful, but certainly some may be useful. Experimentation is the key. I've already verified, for instance, that the brakes can be applied on the ground, and the engines can be shut down and started up again.

   Additionally, a special FSUIPC control is added which will actually delete a specific AI aircraft.

   These facilities operate through offsets 2900–200B inclusive, and will be documented in the next SDK update. Advanced information for programmers who need this can be obtained now from Pete Dowson.

- A "ready-to-fly" indication is now provided at offset 3364, for FS2004 only. This single byte is set to FF initially, and during aircraft or flight loadings, and cleared to zero when the simulation is ready.

- The ready-to-fly flag just described is now used by the FS Run-Program "READY" option, which didn't really work too well in FS2004 before now. It may solve some window focus-changing problems for automatically loaded programs.

- The menu control facility at offset 32F1 is extended to provide separate control over three of the FS menus, thus:

2^{10}	World menu
2^{11}	Aircraft menu
2^{12}	Flight menu

These are in addition to the already allocated bits.

- The menu control for the FS2004 'world' menu now works. There was a bug in earlier versions (actually due, surprisingly, to the removal of the Scenery Library entry from that menu).

Version 3.11 (October 2003) includes:

- An error in the TCAS tables for FS2004 resulted in the longer airline+flight name strings using 15 characters instead of the (newly restricted) 14, thereby losing their zero string terminator. The 16th character has been re-assigned to provide the ATC status of the aircraft on FS2004, and so is not zero. The error resulted in some program displays showing spurious characters at the end of the 15 valid characters—my own TrafficLook was one of the programs affected!

- The Technical page option for axis "spike removal", designed to fix some rather special programming errors in certain complex panels, did not work in all such panels on FS2004 because of a small change in the way the FS Command is formulated. The facility has been changed to deal with this and any future such similar differences.

- Compound button programming is now extended to allow them to use repeat actions too. For this the prefix "CP" (for Compound Press) is changed to "CR" (Compound Repeat).

- Separate left, right, inboard, outboard, leading edge and trailing edge flap read-outs (both actual angle and percentage of max) are now available under FS2002 and FS2004 at offsets 30E0–30FF. Full details will be in the next update to the SDK.

- A table containing a lot of the data being currently used in the FS2004 GPS has been mapped to offsets 6000–61FF. Not all of this has yet been decoded, and I am not sure if writing to any of it will do anything useful, but as much information about this as is known will be included in the SDK update.

- A 16-bit count at offset 333E is incremented each time the FS "clear weather" routine is called, no matter whether this is by something inside FS itself or explicitly by FSUIPC on behalf of an application program or User Hotkey. This works on FS2000, 2002 and 2004. It may be useful as a signal to weather control programs to re-initialise the weather, particularly after a Flight reload (such as one to an AutoSaved flight, after a crash).

Version 3.10 (September 2003) superseded version **3.09** before the latter was truly available, but both included all these changes *except* the first, which was only in **3.10**:

- DLLs which are accredited and which register themselves directly through the IPC interface are now automatically also listed in the user's KEY file. This allowed the registration system for GAUges to be streamlined without any adverse effects on DLLs.

- A bug is fixed which prevented gauges or DLLs being *manually* registered by the user if their names contained any non-alphanumeric characters (i.e. not one of A–Z, a–z, or 0–9). This did not affect the correct registration automatically, by the gauge or DLL writing to offset 8001.

- The registration checks for DLLs and Gauges in an unregistered FSUIPC installation is made much more efficient, so that if it is repeated often because the DLL or gauge is unaccredited and keeps retrying the access to FSUIPC, it now has no noticeable affect on frame rates. Of course, the DLL or gauge will probably not be working correctly because of this lack of access. The FSUIPC Log now records instances of access by DLLs and Gauges so that this can be checked more easily.

- The Button programming repeat action is now fixed. It has not worked correctly in recent releases except for PFC buttons and switches.

- A number of changes have been made to the IPC interface, as follows:

Offset	Size	Use
02FB	1	Provides ADF2 ident sound switching and indication (FS2004 only)
05E4–05EE	varies	Slew controls now work reasonably accurately with FS2004
31D8–31E2	2 (x 6)	Provide the slew axis input values (all versions of FS)
32FC	2	The AIR file change counter is incremented when the FS2004 control to reload the user aircraft is used—provided that control is assigned to a button, or assigned to a Key in FSUIPC, or executed through FSUIPC's interface. Controls assigned to keys in FS's dialogues aren't detected.
3300	2	Bit 11 now indicates a good signal on ADF2 (FS2004 only)
3370	4	Provides "active" counts for assorted PFC.DLL threads—see PFC release 1.63
3374	4	Provides the millisecond counter used to label Log file entries
3378	4	Provides the millisecond count of the last Log entry

- If you are running the PFC driver too (PFC.DLL), the FSUIPC Hot Key page provides a setting to reset the PFC serial port access. This is mainly to help restart the PFC driver after any power outage or mishap on the serial port. It only works with PFC DLL version 1.63 or later.

Version 3.08 (September 2003) includes an important bug fix for FS2002 users, and several small improvements:

- The button and key allocation option pages are now working correctly again on FS2002. In version **3.07** (only) the access to FS2002's CONTROLS.dll was messed up and this caused FS to crash when any attempt was made to access the drop-down lists of controls. This also had the same effect with PFC.DLL because that uses FSUIPC for this function.

- The Tail Hook position, mapped at offset 3BA0, now works correctly on FS2002 as well as FS2004.

- The initialisation changes that come about because of the default setting of **InitDelay** being set to 0 may have been too drastic on some systems. In this version several operations in FSUIPC are now again delayed for a number of seconds. Only the Window subclassing is affected by the **InitDelay** setting.

- In an attempt to try to reduce the stutters that have been reported by some users, the frequency of the weather data updates (for read access by other programs) in reduced on FS2004. It used to be once per 4 FS frames, and this is now reduced to one every 16 frames, by default. It can be changed with a new FSUIPC.INI parameter in the [General] section—**WeatherReadInterval**. This is the exponent of 2 for the number of frames per read. The default is 4 ($2^4 = 16$). A value of 0 makes the updates occur on every frame, a value of 32 will effectively stop them altogether.

  Note that this also controls the rate at which any weather is updated using the old FS98 or AWI interfaces. However, it does not alter weather setting capabilities using the New Weather Interface (NWI).

- The New Weather Interface facility for reading weather at a location or at a specific ICAO station is changed a little. If the signature is not refreshed within the timeout, as well as freeing up the facility for other programs to use, the continuous updating of the last-read station or location is stopped. The ICAO, Latitude, Longitude and Altitude are all zeroes to indicate this. This is part of an overall attempt to make the weather operations more efficient.

  WeatherSet2 is enhanced to refresh the ICAO or location requested in its "Station" entry at regular intervals, so that it can reflect changes in real time. However, it uses a signature of zero, which means any other application can take over at any time and read whatever it likes instead. Of course, when that happens the display in WeatherSet2 changes to match.

- Additional values are now accessible through the IPC interface, for FS2004 (and FS2002 in one case). These are:

02D4–02FB	Assorted values related to reading and setting ADF2
13FC	The number of payload stations for this aircraft
1400 and ff.	Data for each of up to 61 payload stations, including weight, position and name.
2DC6	The Heli "Beep" value, whatever that is (sorry). [FS2002 also]

  As well as this, the offsets for access to some BGL-accessible variables are now known and are published in the revised Programmers Guide (available in the SDK update being released simultaneously with FSUIPC 3.08).

Version 3.07 (September 2003) contains several new minor features and some fixes and improvements:

- The sub-classing of FS's main window is now done immediately FSUIPC is initialised, though it can be delayed by using a previously undocumented parameter (InitDelay=<milliseconds>) in the [General] section of the FSUIPC.INI file. This change is part of an attempt to reduce the probability of FS suffering black screen problems when switching between windowed and full screen modes. Full details of this will be found in the back of the User Guide. In previous versions the delay was 3 seconds, so if anyone finds FSUIPC worse with the delay omitted they can restore it by using "InitDelay=3000".

- A problem in some systems, where the Joysticks tab in FSUIPC's options doesn't appear, has been fixed. This seems to arise when the FS Controls.DLL is loaded into a different location than usual, but why this occurs sometimes on a few systems hasn't been determined.

- A small memory leak in FSUIPC's weather routines for FS2004 has been plugged. This has been reported as causing insufficient memory reports after 12–14 hours flying.

- The flight loading facility in the IPC interface now operates correctly on non-English versions of FS2004. Previously the correct folder may not have been used—it varies according to the Language. FSUIPC now gets the folder name from FS's own Language.DLL.

- An "Autobrake Set" control is added to the Keys and Buttons programming facility.

- A hotkey facility for selecting all engines is added. Apparently there are times when FS's own key sequence for this (E 1 2 3 4) doesn't work—notably on 3-engined aircraft it seems. This facility selects all engines by writing the correct bit pattern to the location that matters.

- Facilities are added for external programs to utilise FSUIPC's Buttons programming capabilities by altering "virtual button" indications via the IPC interface. Virtual joysticks 64–72 have 32 buttons each, mapped to offsets 3340 to 3363 inclusive. Setting a bit in one of the nine DWORDs is seen a pressing the corresponding button, and clearing a bit as releasing it. The 9 x 32 button capacity is chosen to suit the available button connections possible on the Aerosoft 747 MCP (4 x 72), but it should be easily adequate for any implementation.

- The Tailhook Position (a 64-bit floating point value, or 'double') in FS2002 and FS2004 is now mapped for reading and writing at offset 3BA0. This has not been tested prior to release though. Whether writing to it actually positions the tail hook is not known.

- The logging is improved for developers by logging the details of illegal access attempts—that is, attempts to access parts of FSUIPC's offsets which are not allowed for unaccredited programs in an unregistered installation of FSUIPC.

Version 3.06 (August 2003) includes two important fixes, and an extra facility:

- It turns out that the rain/snow rate value in FS2004 runs from 0 (light) to 4 (heavy), whereas in FS2002 and before it varied from 0 (none) to 5 (heavy). This wouldn't be too bad, if it wasn't for the fact that FS2004 hangs quite nastily, with a black scenery window, if any program tries to set rate 5! I think it may be trying to load and set rain or snow graphics that don't actually exist, and doesn't handle the failure very well. In this version, FSUIPC converts the FS2000/FS2002 precipitation rate values used by weather programs into FS2004 terms, and vice versa.

- The fix in version 3.05, to stop the FS2004 weather 'themes' reverting to 'user defined' didn't cover all cases— if the wind smoothing option was selected this change could still occur. This is fixed correctly in this version.

- A facility is provided to make the graduated visibility operate from the top of the current visibility layer rather than from a fixed user-specified altitude. This is done by setting the lower graduation altitude to zero.

Version 3.05 has some important improvements for FS2004 users:

- The visibility maximum values and smoothing actions are now applied to *all* weathers in FS2004, independently of the weather source.

- Graduated visibility is introduced for FS2004, and also applies to *all* weathers, independently of source. Unlike the FS2000/FS2002 equivalent, this does not make use of the visibility layer, which is left as set by the weather data.

- The New Weather Interface (NWI) now has additional weather setting commands to set local weather "pending" first, and "activated" later. When these facilities are implemented in a weather program, they will help eliminate most of the small hesitations that may sometimes occur when the setting of each station needs activating separately.

- Facilities are included in the NWI for programs to read the complete weather data for any place in the FS world, by providing the Latitude and Longitude. WeatherSet2 is revised (version 1.31) so that it can use this facility too.

- By default FSUIPC now no longer applies any of the weather filter actions to FS2004's own global weather settings. This action had the unfortunate side effect of always switching FS's Weather settings to "User Defined", even if a Theme was selected. If you use FS global weather and want the FSUIPC filters to act upon it, you now have to alter an option in the Technical page.

- Weather data and other values are now still updated when FS is minimised. The update rate will be reduced, however (2–4 fps).

- Additional IPC offsets now working in FS2004 include:

    0AF0, prop type: 0=fixed pitch, 1=constant speed
    0C20, the current FS time in string form
    30D8, dynamic pressure
    3BD6, a new set of "partial panel" failure control/flags, including separate NAV/COM 1 & 2 radios

Version 3.04 changes include the following:

- A problem in recognising accredited program names longer than 15 characters, on Windows 2000 (only), is fixed. This particularly affected Flight Deck Companion users on Win2000.

- An odd problem, possibly related specifically to non-English language versions of Windows XP, whereby accredited programs were still rejected *even on a Registered FSUIPC installation* has been fixed.

- The flaps calibration, changed to suit the new FS2004 flaps control, is now working properly (again?)!

- The wind gusts reported via the old FS98 interface are now set to zero correctly when there are no gusts.

- FSUIPC now supplies valid addresses to WideServer for all data, even data that is not present for the specific aircraft which is loaded. This overcomes a problem noticeable in WideClient, with such data never being received from the Server and thereby causing "wait for data" timeouts (defaulting to 500 milliseconds) and hence jerky operation. These wouldn't have been noticeable on clients not trying to read the specific non-existent data, nor if the data wait timeout had been turned off. (This is more likely to have happened on FS2004 as the aircraft data structures are now simply not created by FS when they aren't needed).

- The following values, accessed through the IPC interface, are now valid, or at least better, in FS2004:

  1. EGT for props. It seems that the units used for this value for props are not the same as those used for Jets. Only the latter appears compatible with FS2002 and before. Until we know more about this, I have derived an approximate conversion formula empirically so that the Prop values, too, are more like their FS2002 values.

  2. The ADF dial setting at 0C6C is now working, both read and write.

  3. The Nav/GPS switch at 132C is now working, both read and write.

  4. More of the "available function" flags in the 077C ff. Range are now working. In fact I think there's now the same coverage as in FS2002.

- The standard "SIM RATE SET" control seems to have been broken in FS2004. I've added some code to intercept this and work it within FSUIPC instead. This also makes the SIM X1 hot key facility work.

- The IAS smoothing option in the Technical page is now enabled by default, so will work even for unregistered FSUIPC installations.

Version 3.03 contains a variety of minor improvements and some important error fixes:

- The weather interface for FS2002 is fixed. Previously it didn't become operable until some external application actually wrote to the IPC interface.

- The weather defaults for an unregistered copy are now the same as the "minimum weather defaults". Since they cannot be altered in an unregistered copy it seems wrong to impose any filtering actions, such as the minimum and graduated visibility, which normally defaults on in FS2002. The only exception made to this is to enable the "extend METAR max vis" action, as otherwise there'd be too many 10sm and 9999m visibilities set!

- Checks are now in place for Registration on a Win2000 or XP system being used without "administrative rights". Registration is like an install and needs the user to be the administrator.

- Facilities are now included for DLLs and GAUges to be accredited manually. This is done by entering the name of the gauge or DLL (with the .gau or .dll part) into the dialogue box, and providing the access key.

- The new AXIS_FLAPS_SET control, assignable in FS2004's joystick assignments dialogue, is now recognised by the FSUIPC joystick Flaps calibration facility. It also corrects the action of the FS2004 default operation, which seems to need −16384 to set zero flaps, but calibrated values from 0–16384 for the other settings.

- A flag is provided which tells external programs whether thy have full access to the IPC or not. This can be read without triggering the message box to users telling them of an un-accredited access attempt. The location is the byte at 330C (hex) and the flag is the 2^1 bit—it will be set if access is okay. (On WideFS it will always be set, assuming WideServer is registered on the FS PC).

Version 3.02 includes a further fix to the Registration system, interlocking the attempted access by applications so they do not interfere with the Registration dialogue at all. Previously some registrations may have been difficult or even impossible if application programs were running at the time.

Also, an error in 3.01 is fixed which can, in some circumstances, cause the Message Box warning of un-accredited program access to appear when it isn't true.

Finally, the FSUIPC INI file parameters to operate the TCAS options for AI aircraft are now usable even in un-registered copies of FSUIPC, though you have to edit the FSUIPC.INI file to change them. Details of INI file parameters are given in the Advanced User Guide.

Version 3.01 was released quickly after 3.00 to fix some little problems introduced with the Registration system:

- It is made to properly deal with registration details with accented or non-standard ASCII characters

- It now does not repetitively log the details of a single application failing to provide the correct access key. However, large logs may still occur if more than one program keeps attempting access, as it only remembers the last one each time.

- The first time any program is run without the correct access key, on an unregistered installation, a Message Box is now produced to warn the user, and asking him to look at the log file.

Version 3.00 (July 2003) is the first official version which supports FS2004 as well as the previous versions. It is also the first to need user registration for full access to all facilities, or access keys from accredited programs for the IPC interface.

As well as these changes the main addition, specifically for FS2004, is the "New Weather Interface", which allows external programs to read and write weather by METAR station ICAO reference. This is the first time local weather control has been offered to external programs. Full details will be included in the updated SDK, which will follow the release of 3.00 as soon as possible.

Version 2.975 includes these changes:

- Fixes the time-out for externally injected AI Traffic data, such as that provided by AI Bridge for TCAS display of MP traffic. The change in 2.96 to the way FSUIPC timings are related to frame rates caused less than the specified 6—12 seconds to be allowed before a refresh by the injecting program is needed.

- Non-centred axis calibrations now work correctly even with maximum input values of less than 512. Note that such small input values are only likely if the original axis was either completely uncalibrated (in Windows), or had its FS "sensitivity" slider set far too low.

- In FS2002 the reverse throttle limit is now automatically adjusted to provide full reverse for each aircraft, individually, rather than assuming that the maximum reverse is always around the –4096 value.

- The G-force value at offset 11BA can now be written to (though this appears to have no useful effect).

Version 2.972 corrects a few odd things that occurred as a result of changing to FS frame rate as a base, rather than the timer. In particular, the timeouts on application hot keys, menus and other things, would have varied according to frame rates—being only as promised if the frame rates held steady at 18 fps. Also any programs loaded automatically with the "READY" option would load *before* the scenery had finished loading, not after everything was really ready.

Version 2.971 was issued a day after 2.97 to fix a problem with FS98 only. Installing 2.97 on FS98 would make the latter crash in SIM1.SIM soon after loading.

Version 2.97 (February 2003) is a relatively minor bug fix. The following changes were included:

- The IAS smoothing option works on a timed basis instead of by frame rates—the change in FSUIPC to be frame rate based rather than timer based shortened the smoothing period for frame rates better than 18 fps, and so the output wasn't as smooth as it should have been.

- The version 2.96 fix for the processing of application hotkeys was incorrect. The option to allow hot keys through to FS became inoperative.

- The decay slope for the toe braking pressure, when the brakes are used via the FSUIPC joystick facility for brakes, is timer-based again, as before, not based on frame rates.

- Additional Project Magenta support is provided in the FS controls drop-down for Buttons and Keys assignments. Facilities for switching the electrics in the glass cockpit have been added.

Version 2.96 (February 2003) includes:

- Details of nearby ground AI traffic are now available for programs that can use them. The aircraft included are subject to an in-built range limit set to 6 nm if the user aircraft is airborne, or only 3 nm if the user is on the ground. This should be adequate for ground traffic avoidance calculations and airport movement plotting.

- The rate at which AI traffic is scanned has been increased to 10% per FS frame, with a parameter in the INI file (TrafficScanPerFrame) to adjust it (0=off, 100=all traffic updated on every frame).

- If either of the airborne or ground AI traffic tables becomes full, those aircraft furthest away are discarded in favour or new ones arriving if the latter are nearer. This means it is less important to limit the range, although the default of 40 nm for airborne traffic is still retained for performance reasons.

- The cloud options for FS2002 now allow the Virtual Sky or Jet Trails facilities as alternatives.

- A hot key assignment facility is added to hide or show the AdvDisplay window. This is for use with the new version of AdvDisplay (2.00) being released shortly after FSUIPC 2.96.

- The visibility smoothing and graduation operation updates the visibility values in FS at less frequent intervals in order to try to reduce the horizon flickering noticeable on some video cards, notably the Matrox Parhelia. Though it seems these phenomena might be video driver faults, it seems best not to provoke them!

- The upper altitude for the surface visibility layer is automatically adjusted to be above the METAR station elevation (if known). The adjustment is to 1000 feet above when graduated visibility is in operation, or 2000 feet above when it isn't.

- FSUIPC is now conducting most of its operations once per frame, rather than at regular timer ticks (18/sec). This will mean it is sometimes slower, sometimes faster, just like FS itself. But more importantly it should lead to smoother operation of FS as a whole even in situations where there are many applications using FSUIPC. It may also lead to better stability, but time will tell. [To prevent FSUIPC stopping altogether in some circumstances, such as when FS is minimised, if the frame rate falls below 5 fps FSUIPC reverts to time-based operation until the frame rate rises].

- The operation of changing the gyro drift value (offset 0C3E) is made more consistent, though reading this will still only show the current FS value *not* the last value set, which may still be in the process of being applied.

- An error in FSUIPC's processing of application hotkeys meant that these were passed onto FS even if the flag had been left clear to indicate that they should not be. In fact the operation of that flag was the reverse of that intended and documented. Since developers may have already discovered this, and reversed the setting of the flag in their programs to compensate, the correction wasn't straight forward. The solution was to no longer use that original flag and use the next one up instead. This should mean that by default all current hot key users will set the options so that their hot keys are not passed through to FS. I think this is the safest assumption.

- A bug in the HotKeys page of the FSUIPC options resulted in the "Clear" buttons working correctly but not actually clearing the displayed key press. Additionally, in some releases the hot key changes were not being saved to the FSUIPC INI file.

- A bug in the derivation of the full network path of FS (the "UNC" path) meant that the path at offset 3E00 was only correct if the *drive* on which FS resided had been shared. If only the path had been shared the path in 3E00 was local, not network-usable.

Version 2.95 (December 2002) has these changes:

- A separate surface visibility maximum for rainy/snowy weather is provided.

- There's a new Joystick options page which provides facilities for configuring axes as thrust reverser, aileron trim and rudder trim.

- A bug is fixed in the visibility setting for external programs, which actually prevented the visibility being changed if the smoothing and graduation options were both disabled.

- A minimum visibility value of $1/100^{th}$ mile is now imposed even if zero is specified. This is to avoid some odd graphics effects in FS2002 when zero visibility is attempted.

- Negative FS control parameter values can now be entered in the Buttons and Keys pages of the options.

- A bug in the hot key programming could result in application hot keys not being recognised. This occurs when an ALT+TAB key combination is used to swap to another program. On some systems FSUIPC sees the TAB key being pressed, but not released, so assumes it is still being held down.

- External program control over most of the FSUIPC weather filtering options switches is now provided through the IPC (see Programming Guide, offsets 3127-312F). The user still has an option to stop this happening, however.

- The gyro drift value at offset 0C3E is now writable in FS2002 as well as being readable.

Version 2.94 (November 2002) includes these improvements and corrections:

- Added WideFS "KeySend" facilities to the list of Controls assignable to Buttons or Keys in the relevant Option pages. This makes it easier to configure joystick buttons to operate WideFS clients, and for the first time allows keypresses on the FS PC to be used for this too.

- Added a complete (current) set of Project Magenta controls for programming in the Buttons and Keys option pages. These are included in the drop-down control lists by option, as they add considerably to the length of the list. They are all listed starting with "Pm", with the Airbus specific ones are prefixed "Pm Ab".

- The program running options are augmented by the addition of a "CLOSE" option as well as the existing "KILL". This operates by sending Close messages to the top level windows of the loaded application instead of

killing it as a process. With some programs this is better as it enables tidying up before closure. However, there may be some programs for which KILL is the only solution.

- The IPC offset to switch FS's "slew" mode on or off always only switched the mode, *not* the axis controls that belonged with it. In other words the use of the joystick to control the slew direction and speed was never actually possible if the slew mode had been entered by writing to the IPC offset. This was true in FS98, FS2000 and FS2002, and in fact is probably a desirable result as programs forcing FS into slew mode generally want to control movement themselves without joystick interference. However, in case it is needed, FSUIPC now offers an additional slew switching facility, related to the same offset, which will do a complete switch, just like using the slew control on the keyboard ("Y""). This is also available on FS98 and FS2000 as well as FS2002.

- A possible cause of FS frame rate reduction, which seems to be applicable to only some systems, and is related to the Button programming facilities, has been removed. At least it seems to, according to feedback received during Beta tests. No such performance hit could be detected here so the fix is by no means certain.

Version 2.93 (November 2002) includes these improvements and corrections:

- Implemented the option to convert wind turbulence into wind variance for FS2002 use, but applicable to upper winds only. It seems that FS2002 does exhibit the same lack of wind turbulence as in FS2000, but not actually in the surface wind.

- Fixed a problem with the Buttons option page where an assigned FS control might not 'stick' unless some other facility, such as the parameter value, was accessed after selecting the control in the drop-down list.

- Extended the joystick Buttons programming facility to allow programming of all buttons, switches and rotary knobs on PFC controls handled by my PFC.DLL. This needs PFC.DLL version 1.46 or later. When programming is done in FSUIPC the normal action in PFC.DLL is inhibited.

- Extended the Keys programming facility to allow a different action to be programmed on key release to key press.

- Provided a facility in the IPC interface to disconnect the joystick axes from Slew mode actions (offset 310B).

- Added a facility for FS2002 only to automatically generate an overcast cirrus cloud layer above a specified altitude to allow FS Sky World SE's "virtual sky" colours to be applied. This replaces the vapour trails facility for FS Clouds, which isn't needed on FS2002. The vapour trails option still applies to FS2000.

  Note that if this facility is enabled the real sparse cirrus layer option, if enabled, become 100% probable, not randomly at 80%.

- Fixed an error preventing a new value entered in the options screen for the limit on visibility for overcast clouds being applied—the cloudy limit was imposed instead.

- Fixed another bug in the visibility facilities that could cause low visibilities to occur when unlimited visibility is set in the FS weather dialogue. The weather logging is also fixed to report FS2002's negative visibility as "unlimited" (for that is how it denotes this).

- Changed a direct reference to FS2002's SIM1.DLL data to derive the address at run time. Although generally this address is almost always known and fixed, it seems that in very specific circumstances it can be different, and this could cause FSUIPC to crash.

Version 2.92 (October 2002) includes these few important fixes, and minor improvements:

- A bug is fixed in the initialisation of the cloud thickness values, which caused the value set for thunder clouds to be set in the normal cloud space and the thunder cloud value to reset to its default of 10000 feet.

- A bug is fixed in the new "Keys" options, fixing a problem where the Alt key is shown as Shift and vice versa.

- The use of the Tab key as an extra shift, to provide more keypress combinations, is extended to the Hot Keys page and also to the IPC interface Hot Keys facility (using bit 2^4 in the Shift State indicator byte).

- It seems that in FS2002 the "gradual" shear setting for wind layers actually works, or at least it smooths the wind speed and direction more reliably than did FS2000 where gradual shear could give sudden drastic reversals. The current ambient wind data read out at offsets 0E90 and 0E92 did not take into account these transitional values. This is fixed so that the read outs always reflect what is *believed* to be the actual wind affecting the aircraft track.

- A bug is fixed which could prevent some add-on programs adding items to the Flight Sim menu. This affected those which operated by intercepting the "WM_INITMENU" and/or "WM_MENUSELECT" messages.

- The gyro drift value at offset 0C3E is now populated by FSUIPC for FS2002. It is a read only value.

Version 2.91 (October 2002) includes these fixes, improvements and new facilities:

- The handling of graduated visibility and the application of the visibility limits is improved when using local weather, including downloaded "real weather", in FS2000 and FS2002. The visibility smoothing is now correctly not applied when using local weather—it shouldn't be needed as FS should be interpolating weather between METAR stations and hence "smoothing" changes out itself.

- Facilities for assigning FS controls to key press combinations have been added, used via a new page in the Options dialogue. These facilities act in *addition* to those in FS's keyboard assignments (though take precedence when the same keypress is programmed in both—you won't get both actions). The advantage this gives is simply that FSUIPC offers access to the complete range of FS controls, and even allows assignment of parameters to those that take them.

- Additional "pseudo-FS controls" are added to allow joystick Button "flags" to be set, cleared, or toggled, for testing in conditional button operations (described next). These controls can be programmed for buttons or key presses.

- The button programming facilities now allow multiple actions to be listed for any buttons, selected by the state of other buttons (or, more likely, switches). This also allows two-phase rotary switches to be programmed without needing special hardware or software. Up to two conditional buttons *or button flags* can be specified. Please see the Advanced User's Guide for details. These facilities cannot be used from the on-line Buttons page.

- The facility to restrict cloud thickness is extended to allow a different maximum thickness to be applied to thunder clouds.

- The IPC interface now provides a "protected mode" control, to allow applications to restrict FS Menu access, set default FSUIPC weather options, and stop FSUIPC options being changed. Details will appear on the next edition of the FSUIPC SDK.

- The IPC offset 0E92 should contain the Ambient Wind direction based on degrees Magnetic for the surface wind, but True for upper winds, for full FS98 compatibility. In fact on FS2000 and FS2002 it contained the Magnetic direction in all cases, which is wrong. (With wind transitioning enabled this actually made no difference, as the transitioning works by having only the one layer). This error is now fixed.

Version 2.90 (September 2002) includes these fixes, improvements and new facilities:

- A facility is added for FSUIPC to automatically run additional programs whilst FS is loading, or after it is ready. This facility is controlled by parameters in an additional section of the FSUIPC.INI file, entitled [Programs]. The facility is not accessible through the on-line options in FS, but by editing the INI file, and this is described in the Advanced Users guide. José Oliveira has kindly supplied a utility program called "Run Options" to edit these options, and this is available in a separate Zip ("FSUIPC Run Options.zip").

- An option has been added on FS2002 to actively smooth the IAS (indicated air speed) value supplied through the IPC interface for external programs. This is to get over a slight (less than 1 knot) regular 'jitter', like a ratcheting action, observed in climbs and descents in FS2002 only.

- Whilst fixing some of the visibility problems in version 2.89, I broke the visibility smoothing facility. When enabled it prevented external program control over the visibility! This is fixed.

- The spike removal action is now available for aileron and elevator as well as rudder (see the Technical Options page). This gets around another apparent 767PIC problem whereby the elevator can get stuck in a full nose-up configuration.

- Switching off main throttle and prop pitch axis mapping now resets the calibration on the mapped throttle and prop pitch axes too. This was previously confusing folks who had mapped the throttle in order to get a reverse range, but then changed their minds, and didn't realise that the calibration on the mapped throttle page was still active. It seems that these separate throttle axes are used by 767PIC (and probably other panels) when the engine control unit is engaged (which I think it is by default).

- A mapped throttle or prop pitch axis does not now impose calibration on any *external* use of that axis, only on the values mapped from the original input. This was quite a nasty problem, as folks who did map the throttle in order to get a reverse zone found that the 767PIC engine control unit (and maybe others) was then setting odd thrusts.

  This was because, for instance, in order to have a small reverse region at one end of the throttle lever range, that calibration involved putting "idle" down at negative values, like –5000 or so, instead of 0. When the Engine Control Unit set idle, it of course set 0, but FSUIPC was calibrating it to some positive thrust value as obviously 0 is well above the idle of –5000.

Unfortunately this doesn't help multiple throttle users with reverse calibrations on the same levers. FSUIPC has no way of discriminating between controls arriving from the real throttles and those arriving from the Engine Control Unit. Such users will either have to calibrate with zero idle, or find some other way of controlling reverse thrust, or perhaps just switch off the ECU in the panel altogether.

- Use of the FSUIPC interface by internal modules has been made more reliable by allowing access to FS internals earlier than before, at least on FS2002. In previous versions many of the facilities were not accessible until all parts of FS had initialised and 'settled down'. This was to avoid crashes caused by access to parts not yet ready. Internal modules are liable to request access long before external programs and this was a problem unless they took care to either keep retrying or to delay their requests by quite a substantial time.

  The relaxation of checks applies only to those facilities which are not dependant on parts of FS loading, and are more extensive on FS2002 than other versions (because in FS2002 SIM1.DLL is resident, whereas on earlier versions SIM1.SIM was loaded and re-loaded with aircraft).

- The clock synchronising option for FS2002 is now automatically disabled whilst the simulator is run at speeds other than the normal 1x.

- The AWI-read visibility for the surface layer now reflects the current visibility, not the target. These two can be different if visibility smoothing is in operation.

- A.I. aircraft that are listed with *negative* altitudes are now not entered into the TCAS table. It seems that some such entries can be generated by presumably faulty additional AI traffic packages—the case that affected my system was for British Airways. The problem with these entries is that they seem to stay in FS's list of active AI aircraft forever, and so occupy space in FSUIPC's tables better used for real aircraft in flight.

- A number of small additional improvements have been made, particularly in the way the exact "local" weather is determined. This may provide more predictability in areas of many close METAR stations providing conflicting weather data.

Version 2.891 was released quickly after 2.89 to fix a silly little bug in the new Menu facilities which could cause a spurious entry to appear in the Modules menu, depending upon other unrelated FSUIPC settings.

Version 2.89 (August 2002) includes these fixes, improvements and new facilities:

- The code to fix the visibility base for stations below sea level did not work in version 2.88 and in fact could set a base above the station, rendering some ATIS reported visibility values incorrectly.

- The visibility smoothing option did not work well with the graduated visibility feature. In fact it more or less nullified the graduations altogether. This is fixed in this release.

- Changing the lower altitude for graduated visibility now has an immediate effect and can override previously set values. External programs and use of the Weather menu can still change the value being used subsequently, as before.

- The reversal of the default for the "fix control acceleration" facility in version 2.88 was unfortunately not implemented completely correctly, so the selection of this as "Yes" recorded in the FSUIPC.INI file was disregarded, making it necessary to re-enable the option on each load.

- Modified the Button dialogue so that the full name of all of the FS controls can be read, and added two special "pseudo- FS Controls" for Roger Wilco "push to talk" on/off controls. These use RW's own message values, avoiding the problems some versions have with key press interception.

- Added an option to synchronise the FS2002 clock's seconds with the PC's system clock. Apparently FS2002 otherwise runs slow compared to real time. The correction is thanks to José Oliveira, who worked out a suitable fix and originally published it in a separate program (clock.exe). The option is defaulted off, and appears in the Technical page.

- Fixed the engine oil temperature value in the FS98 offset locations (08B8 etc) to correctly provide negative temperatures as well. Apparently these can occur at low OATs when the engine is out. Whether the original FS98 values could go negative is not known, however.

- Added a facility for external applications to add entries to the Modules menu via the FSUIPC interface. This operates like the Hot Key facility and is, in fact, an extension of it. Consequently even applications running on a separate PC, under WideFS, can use the FS menu. Details of how to use this facility will be published in the next update to the SDK, but meanwhile interested developers should contact Pete Dowson for details.

Version 2.88 (August 2002) includes these new facilities, fixes and improvements:

- Added extensive joystick button programming facilities, converting button presses/releases into keypresses or FS controls, handled through a new page in the options dialogue. Whilst this is particularly suited to EPIC users,

it is not EPIC-specific and so can be useful for any joystick system with 'spare' buttons, provided these are visible through the Windows joystick interface (e.g. Game Controllers applet in the Control Panel). The range of FS controls assignable exceeds those which can be assigned in the FS 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.

- Added a facility for smoothing visibility changes supplied by external Weather programs. This is defaulted off. The user can control the speed of changes by setting a time when selecting the option in the Visibility page.

- Fixed a problem whereby changes made in the FS weather dialogue would not take effect with certain FSUIPC options enabled. This affected wind settings when wind transitions are enabled, and visibility when graduated visibility is enabled. (This problem actually dates right back to 2.83 and was due to the changes made for NT/2K/XP systems where saving flights could not be detected in order to restore the weather first).

- Fixed the Joystick calibration section for four separate mixture levers so that the centering ("idle") action works correctly.

- The "fix control acceleration" facility for FS2002 is now defaulted off instead of on. It turns out that this facility can adversely affect the keyboard control of some third party panels. Those panels affected (one notable example is the DreamFleet 737) continuously send controls to FS, several every second, and these trigger FSUIPC's "fix control acceleration" action when enabled. This actually does no harm to those controls, in fact it helps, but the fact that the acceleration timer is reset each time actively prevents keyboard controls from accelerating at all. FSUIPC cannot "fix" those as the keyboard controls do not go through the same interception mechanism.

- Added a facility for an external program to supply "KeySend" codes in the FSUIPC address space, for use with Wideclient.

- Dynamically adjusts the visibility layer base for places below sea level.

Version 2.87 includes just these few fixes and improvements:

- Added the COM1 frequency to the TCAS data supplied for A.I. aircraft.

- Fixed the facility added in 2.86 to allow aircraft to be added to the TCAS list by external programming. In the original version updates actually created additional entries.

- Adjusted the joystick calibration facilities so that by default there may be a small dead zone at either extreme. This change enables the next change:

- Provided an optional "spike" eliminator for the rudder, removing and discarding inputs from rudders which are actually at or beyond the extremes (–16383 or +16383). This action is mainly to overcome a problem reported with the Wilco 767PIC on FS2002, when the Yaw Damper is disengaged. If you use this option you should calibrate your rudder in FSUIPC, making sure you have adequate 'dead' zones at either extreme. If you do not do this then attaining maximum deflection may not be possible.

- Added an IPC offset (3126) to control directly the view direction (the main out-of-cockpit view). Unfortunately no way of detecting the currently set view has yet been found.

- Extended the facility for sending FS controls (IPC offset 3110) so that most (valid and working) controls do actually work on FS2002—previously those which did not relate to the simulation engine may have been ignored in FS2002 (only).

Version 2.86 (June 2002) includes a number of fixes and improvements, as follows:

- Moves the "hot key" options from the Technical page to a page of their own, allowing additional hot keys to be configured on-line, and tidies up some of the existing FS "fixes and improvements" options.

- Provides user aircraft ATC details—flight number, airline, tail number and aircraft type—as declared in the AIRCRAFT.CFG file, for use by programs using the IPC interface.

- Includes a facility for external programs to add aircraft to the TCAS tables in FSUIPC's data space. Details of how this is used to, for example, add MP aircraft, will be published in the next edition of the SDK. Meanwhile, apply to Pete Dowson if you need details.

- For FS2002 only, the "NavFreq50KHz" option is added. This forces NAV1 and NAV2 frequencies to be set at 50KHz intervals rather than 25KHz intervals. The option is defaulted off. When enabled it operates on both 'use' and 'standby' NAV frequencies.

- Allows APR, GS and BC autopilot hold modes to be turned off (when already apparently off) without disengaging NAV1 lock. This is done by re-engaging the NAV1 lock after turning off any of the other three

modes. This only affects FS2002, when turning off the other modes does turn off NAV lock (which is, after all, also the LOC component of approach modes).

- Fixes some IPC offsets that needed trapping for activation in FS2002 so that they now also operate if only the high part is written. These offsets are: 07D6 (Altitude hold value, high word, i.e. metres) and 07EA (Mach hold value, high word, i.e. whole Mach number).

- Adds support for the four "AUTOCOORD" controls (TOGGLE, OFF, ON, SET) in FS2002. These now operate the auto-rudder switch successfully, though not the option in the Aircraft–Realism menu. IPC offset 0278 is confirmed as working in FS2002 though again it doesn't affect the menu option.

- Adds support for separately switching multiple fuel pumps, via a byte at offset 3125.

Version 2.85 (April 2002) includes only two changes:

- The "magic battery" facility is completely changed. It now operates to sustain the battery voltage for longer, instead of operating the "Electric Always Available" override. This makes it completely independent of Aircraft settings, battery and avionics switches, and engines. For added flexibility the rate of discharge can be controlled by parameter in the Technical options page.

- The "Spurious Wind Fix" option, which was defaulted on since 2.84, is removed altogether, as it does not work and creates an assortment of other problems.

Version 2.842 (March 2002) was released quickly after **2.84** to correct problems brought about by the experimental code to detect and try to release stuck or 'spurious' winds (the "SpuriousWindFix"). Apparently, on some systems, the original code had an unwanted effect on the temperature, making it fluctuate quite badly at times. In **2.842** the code has been changed to avoid this, and is also now only activated when the wind difference has been over 5 knots for over 10 seconds or so.

Version 2.84 (March 2002) contains these changes:

- The "white-out fix" option, originally introduced to fix a problem in FS2000, may or may not be applicable to FS2002. This has not been determined. However, it seems that the clouds in FS2002 can extend up to 100 feet above and below the specified values even when a deviation of zero is specified. This can cause the bug fix applied by FSUIPC to operate, apparently clearing the cloud away when it shouldn't and so making the cloud layer appear very thin. This is fixed in this version by allowing a deviation in cloud extents by up to 200 feet in either direction, in addition to the declared deviation.

- Facilities are added, in the Joystick section, to map twin propeller pitch and, independently, mixture controls, to suit four engine aircraft. This operates in the same way as the facility to map two throttles to four engines, i.e. 1 to 1+2 and 2 to 3+4, and is only effective when a four engine aircraft is being used.

- The Joystick mapping facility (two controls for four engines) is extended to also operate with three-engined aircraft (1 to 1+2, and 2 to 3). This operates independently from but similarly to the four-engined mapping already provided.

- An option is added, via the INI file only, to force FSUIPC to provide cumulus cloud cover exactly as requested by the external weather control program, rather than adjusting it for visual appearance. This applies to programs using the FS98 weather interface (e.g. Squawkbox) not the Advanced Weather Interface (e.g. FSMeteo). The parameter is **KeepFS98CloudCover**.

- A facility is provided in the IPC interface to allow external programs, both local and via WideFS, to send controls to Flight Simulator. Any of the controls listed in the FS Controls documents can be executed, with parameters if used. Details will be added to the Programmer's Guide in the SDK—please refer to offsets 3110 and 3114. This facility applies to FS98, FS2000, CFS1, CFS2 and FS2002.

- Read/write access to the complete radio stack in FS2002 is now available in the IPC interface. Offsets 3118–3123 inclusive provide COM2, standby frequencies for all of COM1, COM2, NAV1 and NAV2, and also the sound switches and frequency swap toggles.

- Fixed an obscure bug in the random cirrus and jet trail cloud layer facility which could, in very specific circumstances, and with local weather (e.g. downloaded 'real' weather) only, cause FS to crash.

- Corrected the "RPM scaler" value in FS2002. This value, provided at offsets 08C8, 0960, 09F8 and 0A90, was previously only a quarter of the correct value for FS2000/FS98 compatibility.

- Several additional values are mapped, thanks to help from Timo Frenay. These include access to the FS2000/FS2000 NAV/GPS toggle switch at offset 132C, ADF dial heading for FS98/FS2000/FS2002 at offset 0C6C (in degrees 1–360), and the Texture Quality setting at 0C92 (now also applicable to FS2002).

- The visibility limits facility is extended to allow a separate limit for when clouds are overcast (actually 7 or 8 oktas). This was intended to help with the FS2002 blue horizon problem, but this only whitens when the visibility is below 4 miles, and meanwhile the clouds lose texture first, so it really is not the solution I hoped it to be. (Parameter is **MaximumVisibilityOvercast**).

- Fixed a bug which would sometimes cause zero visibility to be set when FS2002's weather dialogue is used to set "unlimited" visibility. This arose because it seems this option, in FS2002 only, actually sets the visibility value negative (presumably as a marker to mean "maximum"). FSUIPC sees this as below the minimum (which defaults to zero), so sets the minimum! This anomalous value is now detected and treated correctly.

- An option, defaulted on, is provided, in FS2002 only, 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 or whatever. 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: if less than around 400 mSecs have passed since the last control arrived (of *any* description), it stores a time difference value which is checked for certain control actions in the main simulation engine. That routine then accelerates the effect of the control (such as by incrementing/decrementing in 10's instead of 1's) according to that time difference.

  The problem appears to be that the FS code does not care whether the closely timed controls are all the same or all different. I think the assumption is 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. Whether this explains all the cases reported I don't know, but it seems likely.

  The new check in FSUIPC is optional (in the Technical page), but defaulted on. What it does is intercept all the controls, and change the elapsed time location inside 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 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. (Parameter is **FixControlAccel**).

- Another option for FS2002, also defaulted on, is provided to trap certain "User Interrupt" occurrences, which cause the "End Flight?" dialogue to appear on screen whilst flying. Apparently these can occur in certain configurations if the aircraft is over-stressed or has some minor damage inflicted by, for example, taxiing over rough ground. If they occur whilst on-line in multiplayer mode it can prove embarrassing. (Parameter is **TrapUserInterrupt**).

- Changes have been made to the "magic battery" facility, when running on FS2002, to try to address the problem that it prevents the electrics being failed via the Aircraft–Failures menu. First, the option now only operates when Engine 1 is *not* running. Second, the option is suspended when *any* menu dialogue is in use. This seems to cure the problem. Note that the facility cannot 'repair' a battery that has been allowed to run down. The only fix for that is to get an engine started to charge it up, or to reload the aircraft.

- Some rather complex programming has been incorporated in the FS2002 sections of FSUIPC to try to prevent the occurrence of a "stuck" wind speed. This phenomenon has been reported by several users, but is very difficult to reproduce. Whether the "fix" applied now to the relevant FS modules actually works or not is unknown at this time. The fix is optional, defaulted on. (Parameter is **SpuriousWindFix**).

Version 2.83 contains these changes:

- A facility for "Throttle synchronisation" is added. This can be operated by a Hot Key (set only in the INI file), or through the IPC interface using a bit at offset 310A. When throttles are 'sync'ed then the Engine selection (E+1…) is applied to all four engines, and any input on any throttle control is applied only to the main single throttle control. The hot key can only be assigned by editing the INI file.

- With some excellent help from Microsoft, the FS2002 "everlasting rain" bug is now fixed in a more efficient manner that applies to all sources of weather, not just external. This is still optional and defaulted on, but the option is now visible in the Option Dialogue (see the Clouds page).

- The problem in FS2002 of 'subterranean winds' in local "Real" weather, for METAR stations at altitudes over 1000 feet, is fixed by a new option in FSUIPC, defaulted on. This extends the surface wind to within 100 feet of the top of the next wind layer, and also copies that layer's wind speed and direction. This is only done at stations over 1000 feet, and thus makes no actual change to the weather experienced. It just enables several of FSUIPC's options to operate correctly, the most obvious one being the Taxi Wind facility.

- The option to transfer the wind turbulence action to "wind variance", used in FS2000 to overcome the problem that wind turbulence didn't work then, is not offered in FS2002 as it is not needed

- The FSUIPC Wind Smoothing action is no longer applied to local 'Real Weather' winds. Apart from its use in smoothing the change between taxi and normal wind strengths it is not needed for interpolated real weather winds, and it makes the operation of the taxi wind facility very precarious.

- The action taken by FSUIPC in order to restore the wind layers when wind transitions are in use (and the visibility when graduated visibility is in use) did not work under Windows NT, 2000 or XP, due to a difference in memory protections applied to the data being changed. A method of dealing with this has now been found.

  Note that this only applied to users of NT and its derivatives (Win2000 and WinXP), and then only if you use Wind Transitions and/or Graduated Visibility. No other users were affected.

- The two sets of velocities (GS and TAS) available at IPC offsets 3090 and 3178 respectively were cross-mapped for FS2002, This is fixed in this version.

- The dynamic pressure is now available for FS2002 at offset 30D8.

- The ambient wind data at offsets 0E90 and 0E92 was incorrectly set to 0 when local weather was in use (on both FS2000 and FS2002. This is corrected.

- In FS2002, loading the Default Meigs flight went unnoticed by FSUIPC, so this was not recorded at IPC offsets 3F02 ff.

- A long-standing bug is fixed that caused some visibility problems, when running with the graduated visibility option disabled, after loading older Flights (FLT+WX files) which were saved with graduated visibility enabled.

- The "Smoke Control" value at offset 05D8 is now working for FS2002, for those aircraft that support this facility (e.g. the Extra). Unfortunately the marker at 05D4 to show whether the smoke system is avialable still isn't working.

Version 2.82 (February 2002) includes some important fixes and improvements which will be mostly invisible to users:

- Setting of a number of A/P and A/T switches through the IPC interface have been made more consistent, especially when several are changed together.

- The Advanced Weather Interface (AWI) read-outs for Wind and Temperature layers are now able to cope with FS2002's downloaded local weather. Previous versions of FS downloaded weather only supported one layer of each. The results can be seen in WeatherSet's display: the "Set" winds show all the wind layers, the "Applied"" wind shows the current interpolated wind at the aircraft position. The temperature section shows all layers, not the interpolated value as before.

- An error is fixed which, on FS2002, meant that FLT+WX files saved when FSUIPC's Wind Transitioning is enabled did not contain the wind layers actually set, only the current interpolated wind.

- On FS2002 the "SendWeather" broadcast is now always sent as soon as possible after any change in rain or snow. This is in an attempt to circumvent the "everlasting rain" bug in FS2002. See also the next item.

- Weather provided from external sources, like FSMeteo, should now not experience the FS2002 "everlasting rain" problem. This problem is apparently due to an error in FS2002's weather routines which creates a second rain animation when a cloud base (or rain base) is changed even through there may be one already existing from the previous cloud, the one being replaced. Later, when no precipitation should occur, the new animation is deleted but the previous one remains.

  FSUIPC gets around this by stopping precipitation for one second when changing a cloud or rain base altitude. This may not be foolproof but has so far turned out very successful. Unfortunately the same sort of fix cannot be applied to downloaded or user-set local weather. For that I fear a patch from Microsoft will be needed.

  This action is defaulted on, but can be turned off in FSUIPC.INI (just set the "FixRainProblem" parameter to "No").

- The wind transitioning and graduated visibility facilities are now reset when a new flight is loaded. This fixes a problem in FS2002 where changing either wind or visibility in the "create a flight" dialogue could result in no change at all when going to fly the created flight.

- The Hot Key facility is extended to allow additional key combinations to be signalled. Combinations like Shift+Control+Q can be accompanied by yet another key. The main combination is signalled with the additional keycode as a parameter. Full details will be added to the Programmers' Guide in the FSUIPC SDK in due course.

- An additional facility is added to the AWI (Advanced Weather Interface) to allow local programs, gauges or modules to obtain the QNH for any location or valid weather ICAO code from downloaded local weather. This facility is not usable through WideFS. It will be documented for C users only in the next SDK update.

Version 2.81 includes these changes, mostly technical rather than user-oriented:

- The random rain generation is no longer enabled by default, but when enabled the user has more control over the probability of it starting and, independently, stopping. Additional parameters "RainStarter" and "RainStopper" are added for this.

- The TCAS range limit for AI aircraft did not operate correctly in the Southern Hemisphere. This bug is now fixed. The same problem applied to the TrafficLook program, which displayed the range and heading incorrectly in the South. The included version 1.06 of TrafficLook fixes this too.

- The taxi wind control buttons in the Wind options page are replaced by a single button that changes functions (and labels). Hopefully this will be less confusing.

- A problem of negative upper wind speeds when extending the top wind upwards is fixed.

- Additional checks have been added on memory allocations, with a warning and curtailed FSUIPC operations ensuing if any request for memory is turned down.

- The 16-bit word at IPC offset 337E is constantly incremented whilst FSUIPC is being called by FS. This can be used by WideFS client programs to detect when FS crashes or is closed. Leeway for a 'frozen' value should be allowed, however, as FSUIPC is not called often when FS is loading aircraft and scenery.

- The currently loaded FLT file details at IPC offset 3F04 were incorrect for FS2002—they incorrectly included the full FS path. This is now rectified.

- IPC offset 0842 (vertical speed) is now operated by FSUIPC in FS2002—but as it is derived from the value in 02C8 it does not work in slew mode.

- IPC offset locations 0C18, 0C1A and 0C20 are now operational in FS2002.

- Writes to IPC offsets in the range 3060 to 31FF are now passed through to the FS2002 sources for these values. Apparently this enables accelerations to be changed 'on the fly' (which is a surprise! <G>).

Version 2.80 changes are:

- Added FS2002 option for FSUIPC to intercept ATIS/ATC requests for weather and substitute destination weather details for pressure (QNH), visibility and clouds, where available (e.g. when using FSMeteo). This also adjusts the cloud bases to AGL so they are reported correctly by ATIS. The option is only applied to global weather (not downloaded or user-set local weather).

- Options have been added to suppress all wind turbulence and all cloud turbulence (independently). These are mainly for use in FS2002 when the user has opted for heavy A.I. traffic. Apparently the presence of turbulence nullifies some FS2002 optimisations, and with heavy A.I. traffic being simulated the frame rates can take a dive (e.g. 203 fps instead of 20-30 fpm over Northern France with maximum A.I selected).

- It seems that, in FS2002, wind gusts are specified internally by the maximum wind speed, not the difference as in FS2000, so the **GustsRelative** option is now, in FS2002 only, fixed at **No** and the parameter is removed from the INI file.

- Fixed an error which would prevent the user setting wind turbulence through in the FS dialogue.

- Fixed the A.I. traffic Ground Speed reported in the IPC data. Previously it was being supplied in ft/sec instead of knots as documented.

- Added processing in FS2002 for the "KEY_TOGGLE_ELECTRICAL_FAILURE" event, so that it behaves the same as it did in FS2000 even if the user has set the FSUIPC magic battery option.

- Included an FS2002 option (usable only via the INI file) to convert cloud turbulence into wind turbulence for any cloud layers, not merely those within the surface wind. This was an attempt to fix the dip in frame rates when there is turbulence and dense A.I. traffic, but then it was discovered that wind turbulence had the same effect, so the facilities to suppress both were added. (Note that this also applies only to global weather, whereas the suppression option applies to all weather sources).

Version 2.79 changes are:

- The older flight axis controls (not actually assignable in the FS CFG file now) are not reversed, mapped and calibrated, as they were. This was done for continued compatibility with FS98, but apparently it interferes rather catastrophically with some new panel designs. [*Fixed in 2.781 which went on limited release*]

- Apparently FS2002 suppresses cloud turbulence completely when it occurs within the surface wind layer. This means that using the "extend top wind layer upwards" option when there is *only* a surface wind will render cloud turbulence completely inoperative. Additionally, FSUIPC's own wind transitions operate by making a single thick surface wind layer which it changes according to altitude, so again preventing any cloud turbulence.

  To get around this, FSUIPC now detects when cloud turbulence *should* be operating but isn't, and sets the *wind* turbulence value instead, to compensate. The two types are actually indistinguishable in flight in any case.

  [*This change was incorporated into version 2.782 which was on Beta test for a while*]

- Additional protection against duplicate copies of FSUIPC has been added.

- A range limit has been implemented on A.I. aircraft added to the TCAS tables. This defaults to 40 nm, but can be adjusted in the Technical options and the limit can be turned off altogether by setting the range to 0.

Version 2.78 includes the following changes, in roughly descending order of importance to most users:

- Winds reported via FS2000's and 2002's ATIS, and those used by FS2002's ATC, are corrected to reflect the surface winds when global weather is being used (e.g. weather set from FSMeteo or other external weather programs). For FSMeteo this can be the "destination" surface wind when that has been set. Additionally, to avoid ambiguity in runway assignment, a calm wind is communicated as a 1 knot wind. This is similar to the arrangement for FSTraffic and Adventures so that ProFlight2000 and Radar Contact, for example, select the same runway as the traffic.

- Settings made through the IPC interface to FS2002's autopilot registers (heading, altitude, airspeed, and vertical speed) are made much more accurately now, by using direct access into the simulation engine. Previously the only access method found tended to restrict these settings to integral values.

- The visibility base is now set at –1500 feet, instead of zero, so that those areas below sea level get the correct surface visibility. This applies to FS2000 and FS2002. Settings across the Advanced Weather Interface are converted automatically between 0 and –1500' (in metres).

- The option for the FS2002 A.I. traffic data to provide **TCASbyTailNumbers** is replaced by the **TCASid** parameter, with additional options which can supply aircraft type or title information instead, as required. Details are described in the Advanced User's guide and also in the short text document covering the TrafficLook utility.

- Attitude Indicator and Flight Director pitch and bank values (2EE8, 2EF0, 2F70, 2F78) for FS2002 are now made compatible with FS2000 and promoted to the main offsets table. (This will be covered in the SDK Release 9).

- Setting the brake pressure by writing directly to 0BC4 and 0BC6 now works in FS2000 and FS2002 as, I'm told, it used to in FS98. (SDK Release 9).

- The Magnetic Variation reported to adventures and used in a number of APL variables, is corrected in FS2002. If the same Flight was reloaded after ending an Adventure, the Magnetic Variation value is otherwise set incorrectly (to the default flight value, by the look of it).

- The APL variable GROUND_ALTITUDE is corrected for negative values. Previously, for parts of the world with land below sea level, this variable gave an extremely high positive value instead! This fix applies to FS2000 as well as FS2002.

- The Propeller Pitch calibration page in the FSUIPC options has been corrected to show "Feather" to the left of "minimum", as for turbo-props the minimum setting is the one needing a central null zone, with feathering actually being below this.

- A facility to set a Hot Key to restore the X1 simulation rate is added, though only by adding the **SetSimSpeedX1** parameter to the FSUIPC.INI file manually. This is mainly for use on FS2002 where otherwise each change from, for example, X16 to X1 causes a scenery texture reload. More details in the Advanced User's guide.

Version 2.77 contains a number of relatively minor, but nonetheless, important changes, concerning FS2002 support:

- Autopilot information and control is made available to ADVentures. FS2002 seems to have omitted this. Even the A/P heading setting inaccuracies are replicated (it was out by 1 in FS2000/FS98).

- The VOR1 and VOR2_RADIAL variables for adventures are corrected to be Magnetic, not True, bearings, for FS98/FS2000 compatibility.

- IPC offsets are added for Pushback status and control. These are also made available to ADVentures. (*See version 8 or later of the SDK*).

- IPC offsets are added for surface type and condition. What the information provided actually means hasn't been decoded, nor is it known whether this only refers to the surface when the aircraft is on the ground, or whether it is always the surface under the aircraft at any altitude. (*See version 8 or later of the SDK*).

- The cloud precipitation base is now set to –1500 feet when rain or snow is set, whether through the Advanced Weather Interface, or the special IPC offsets, or from Adventures. This is also applied to FS2000. It fixes a problem where a base of zero (the FS2000 default) meant that rain stopped at sea level. In a Cessna on the runway at Schiphol (EHAM) this would have meant no rain! The value –1500 is adopted as that seems to be FS2002's default—maybe the lowest ground elevation in FS2002 is –1500 feet?

  To avoid this making changes necessary to programs using the Advanced Weather Interface (e.g. FS_Meteo, WeatherSet and WidevieW), negative values for the precipitation base are converted to zero before supplying them across the interface and, conversely, zero values are converted to –1500 feet.

- The wind directions reported in the Adventure variables were negative when in the range 180–359 (i.e. these directions were represented by –180 to –1). This is some change in the ADVDRV module. FSUIPC now takes over this conversion so that the directions are correctly 0–359.

- Requests for Autopilot Mode changes are now only passed onto the FS2002 autopilot when the request actually means a change. Previously, if, for example, "altitude hold on" was requested through the IPC, FSUIPC would command the A/P to turn on Altitude Hold. This made the autopilot re-initialise this mode *even if it was happily holding an altitude already*! The result, in this case, was a sudden burst of porpoising!

- The option to correct the sign on the Vertical Speed when the target altitude meant the aircraft should go the opposite way is improved by making the V/S become zero when the difference is less than 30 metres. This is only applied to FS2002 where the V/S behaviour otherwise seems a little more erratic.

Versions 2.761–6 were limited test releases that contained assorted bits of extra code for FS2002 only to support full Autopilot control and checking in Adventures, plus assorted other changes for testing.

Version 2.76 adds the Technical page option to make the "magic battery" work even if the Avionics switch is off. This option makes the action revert to how it operated in version 2.511, and is apparently necessary for flap operation in Wilco's 767 PIC.

A section is added to the User Guide to explain how to make the FS2002 autopilot usable without forcing wing levelling. This isn't actually anything to do with FSUIPC, but I get many inquiries about it.

Version 2.751 was an interim limited release with the following changes:

- An error in the **SendWeatherAlways=No** facility meant that weather broadcasts were still being sent more often than needed, only being limited by the **SendWeatherInterval** which defaults to one minute.

- A problem in FS2002's vertical speed operation has been worked-around by special action in FSUIPC. Apparently the V/S used for climbs and descents can get 'stuck' at its levelling-off V/S (750 fpm), ignoring the actual set value in the V/S register. Toggling the ALT hold off and back on quickly fixes this, and that is what FSUIPC now does if it spots the condition arising. This is only done when there's at least 1000 feet to go, to prevent interference with levelling off.

Version 2.75 contains a modified method for broadcasting weather changes to other parts of FS2002 (only). Apparently the original method, of sending changes as they occurred, had the unwanted side effect of causing the ATIS identifier (alpha to zulu) to be updated each time.

The weather broadcasts are now, by default, sent at most at one minute intervals, and then only if some aspect of ATIS-reported surface weather has changed by a significant amount. Both parts of this action are controllable by new options, but only via the FSUIPC.INI file. For full details please see the description of **SendWeatherAlways** and **SendWeatherInterval** in the Advanced User's Guide.

Version 2.744 was changed to compensate for an odd feature of FS2002 which clears the SIM1 pointer whenever a new Flight or Aircraft is loaded. This caused some odd behaviour in other modules. For example, AutoSave then stopped saving flights altogether, as it thought SIM1 was missing and so the save data was inaccessible.

Version 2.743 fixed a data-checking problem in the Advanced Weather Interface (as used by FSMeteo) which somehow only came to light with FS2002 under Windows 2000 and XP, even though it is a long-standing error and should have been a problem on FS2000 and Windows 98.

Versions 2.741 and **2.742** were limited interim releases just featuring better acceleration and velocity values from FS2002, for specific tests.

Version 2.74 fixed some new problems with FS2002 operation, as follows:

- Trying to set the OBS1 or OBS2 values through the IPC interface did not work.

- Some location previously used for DME distance and speed data is, in FS2002, used to control the switch on the RMI2 for selecting speed or distance. FSUIPC overwrites this switch and the result was that only speed was displayed in that RMI. The fix is to move the locations for DME distance and speed to FSUIPC's own memory. This works well and hopefully does not deprive any older gauges of this information.

- The GS slope calculation is more accurate. It could have been as much as 0.05% in error before.

Additionally the following FS2002 improvements were added:

- More accelerations and velocities are added, but whether these are correct or not has not yet been determined. They may need changing again.

- Support for proportional toe brake calibration is added back (see the Joystick section of the FSUIPC options). These are using the (new to FS2002) AXIS_LEFT_BRAKE_SET and AXIS_RIGHT_BRAKE_SET controls.

- The Brake Indicator offset (0DCA) is made to work more or less correctly by deriving the value from the brake pressures.

- The demise of the FLAPS_SET capability in FS98 and FS2000 is compensated by allowing another 9working) AXIS control to be assigned in its place, for calibration in the FSUIPC joystick section. The number of the control to be used has to be declared in the FSUIPC.INI file.

Finally, the support for undocking and positioning/sizing the FSNav window has been withdrawn. This has been made necessary by continuing problems in getting it to work reliably, and in trying to keep up with successive releases of FSNav. Folks who miss this feature should write to Helge to see if he would build the facility into FSNav itself, where it will be much easier to implement and more reliable in operation.

Version 2.73 corrected the calculation of the GlideSlope angle, used by precision approach programming like that in Project Magenta. There was a version **2.72** as well, which was nearly as good though not using the correct formula.

Version 2.71 fixed the Joystick calibration section of FSUIPC's dialogues. Due to a change since the final Beta of FS2002, this section caused FS2002 to crash.

Version 2.70 was the first test version released to run with the Release version of FS2002.

Versions from 2.512 to 2.69 were made during FS2002 development to try to keep up with the changes from FS2000 to FS2002. In particular, facilities for driving TCAS for FS2002's A.I. aircraft were added in **2.601**. None of these should now be used.

Version 2.511 was released soon after 2.50 to fix an additional problem with some Autothrottles, again due to a difference in two of FS2000's throttle controls.

Version 2.501 was released within 12 hours of 2.50 to correct a problem with Trim on some panels. This was a conflict of two different trim controls with reversed signs.

Version 2.50 changes are:

- A facility is added to allow a hot key to be defined to set the standard Barometric pressure (29.92" or 1013.2mb) on the altimeter.

- The default wind variance, when converted by option from wind turbulence, is reduced by around 30% by popular request. There is now an additional parameter in the Winds page that can be used to adjust this from very mild to twice as variable as in earlier releases.

- The random maximum visibility extension option is revised to use a linear distribution of adjustments when the maximum visibility set for these conditions is less than or equal to 60sm, but retain a somewhat less skewed distribution (towards the lower values) when the maximum is higher.

- When a Taxi Wind change is requested at an inappropriate time, as, for example, when *not* located within the surface wind layer, FSUIPC ignores the request and makes a standard Message "Beep" (which may be a 'ping' or a chord, or whatever is assigned in Windows). Unfortunately this action also applied when the Automatic Taxi Wind option was selected, making a sequence of such noises occur if the aircraft is suddenly placed in an upper wind whilst in Taxi Wind mode. In this version the sound is suppressed in automatic mode.

- Fixed a bug that prevented newly defined Hot Keys (in the Technical page) working until FS is re-loaded.

- A bug is fixed which prevented applications writing to the IPC offset 3200, used to provoke key presses in FS. In particular, this error stopped the WideClient "SendKeyPresses" facility operating.

- A serious bug is fixed which caused an FS crash as soon as any application attempted to set a request for a repeating hot button.

- The hot button facility for applications is extended to cope with the FS "POV" pseudo-button numbers 32–39. Full details in the SDK.

- The IPC offset 038A now forces and ATIS re-scan, as documented.

- IPC offset 3300, providing radio and autopilot status flags, is now operational as far as possible on FS98 as well as FS2000.

- New controls for specific FSUIPC options are provided at IPC offsets 3308 and 3309 (see the latest SDK for details).

- With FS2000, and assuming that you can actually make successful physical connections (either by multiple Game Ports or USB devices), FSUIPC can now assist in supporting duplicate joystick axes for the main flight controls. It does this by intercepting declared controls assigned in FS2000.CFG and converting them into the assigned controls. Up to 4 elevator, aileron, rudder, throttle, left brake and right brake controls can be equated. For more details see the Advanced Users Guide.

- FSUIPC can feed a specific pre-defined surface wind to FSTraffic when the aircraft is above a given specified altitude. Apparently this is used by some sets of FSTraffic tracks to provide airway traffic. For more details see the Advanced Users Guide.

- A bug is fixed which caused FS to hang in a loop if an application program tried to read or write IPC offset FFFF.

- The altimeter altitude reading is now available to applications at IPC offset 3324. This saves having to calculate it based on the difference between the QNH and the Kollsman setting. Full details in the latest SDK.

- Facilities are provided to allow applications to disconnect the primary control axes from FS, where these are controlled through joystick control inputs. This is so that proper control for auto-pilots can be obtained without spurious interference. For details see offset 310A in the table in the latest SDK.

- The incoming joystick axis values can be read, post calibration (whether by Windows, FS, or FSUIPC), but before being fed to FS (unless stopped by the facilities described in the previous item). See offsets 3328 ff in the latest SDK.

Version 2.40 includes these changes:

- Improved and extended the whole presentation and coverage of the Joystick calibration facilities to make them more flexible and somewhat more obvious. The additions include analogue spoilers, elevator trim, and flaps, and facilities to enable reverse thrust and reverse propeller pitch to be controlled from the main throttle and propeller pitch axes.

- Facility added to make FSUIPC send the wind direction to FSTraffic in degrees Magnetic, instead of True, so that its runway assignments are more in accord with likely ATC assignments in Proflight2000 and Radar Contact, and similar programs.

- Sends a minimum 1 knot wind to FSTraffic in calm conditions so that earlier versions of FSTraffic do assign a runway and provide traffic, and later versions assign a compatible runway to that chosen by ATC, at least most of the time.

- Facility added to fix cockpit windows (i.e. panel parts and scenery views) in position so that they aren't inadvertently moved or re-sized when using the mouse on switches and controls.

- Added barometric pressure smoothing as an option (normally overridden when using FSMeteo, which does its own). This is in the Technical page of the FSUIPC settings.

- Improved the way the joystick calibrations operate by avoiding sending on to FS2000 any values which are the same as the last ones sent. In concert with null zone and centre area calibrations this stops joystick jitter mucking up autopilot settings—especially throttle and auto-throttle interference.

- Fixed a bug in the settings system which caused the settings on all un-visited pages to be reset to default if one of the default buttons (on the About page) had been pressed but then Cancel or ESCape used to retain original values.

- Fixed a bug in the Joystick calibrations settings which could corrupt the centre values if any of the Joy pages were visited then left by pressing Cancel or ESCape.

- Fixed a bug with the FSUIPC wind transition system on CFS2 that prevented a load of a subsequent mission without closing CFS2 and reloading it.

The following changes affect the IPC interface and are therefore only of interest to Programmers (for full details please refer to the Programmers Guide in the 5th release of the FSUIPC SDK):

- Provided a location (the byte at offset 32FE) which changes every time a registered Hot Key occurs, to enable any programs using this feature to do so more efficiently.

- Added a Hot Button facility, working very similarly to the Hot Keys, but able to test any joystick button.

- Added more aircraft dynamics, at offsets 3078–3088, 30D8, 3190–31B8, and fixed the Body Axis linear velocities. (Please see the Programmers Guide in the 5th Release of the SDK for full details).

- Fixed the facilities to display adventure-type text, which were released in a broken state in version 2.30.

- Provided the full network-compatible ("UNC") pathname to the FS installation via a new offset.

- Provided (on FS2000) the full path name of the last loaded Flight (FLT) file.

- Provided facilities (on FS98 and FS2000) to load and save flights by name ('situations' on FS98).

Version 2.30 is another major release, with the following improvements:

- Joystick calibration assistance on FS2000, for more precise definition of limits, dead zones and centering.

- Implementation of fully proportional toe braking on FS2000 for those lucky enough to have USB pedals fitted with these, or additional axis capabilities such as provided by EPIC or multiple game port cards.

- Additional IPC offsets defined for access to more FS2000 values, including current AIR file pathname, current aircraft description (as in the Aircraft menu), flaps détente increment, full body-axis velocities and accelerations (for use with motion platforms), loaded weight, mass and vertical acceleration. Most of these are thanks to Ian Donohoe of ADE fame.

- Facilities for external programs to display text in the usual Adventure display areas (including the diverted Window or remote access provided via my AdvDisplay module).

- Extension of IPC interface memory mapping to 0xFFFF, to allow further third party extensions, plus special support for access to specific modules in FS for expert research. Use of either of these extensions is by arrangement when justified.

- Random cloud turbulence and icing, and wind turbulence toned down a little to make them a little less likely and usually a little less violent. This was considered a necessary change now that the wind turbulence can be made effective by converting it to "wind variance" (which, incidentally, is now determined to be random variations in wind *direction*, not speed).

- The engine starter system for FS2000/CFS2, supported through the IPC interface by special actions in FSUIPC, is improved so that the engine selection is restored afterwards even if multiple engine starting is overlapped. It is still recommended to start engines in sequence, however, ensuring that the starter is disengaged each time before proceeding to the next.

- An old option, "N1N2asFS98=Yes" is resurrected in the [General] section of FSUIPC.INI to allow FS98 model users to start up FS2000 with an FS98 model aircraft and still have N1 and N2 the correct way around before starting engines. (FSUIPC doesn't detect that they need switching till the engines are started).

Version 2.20 includes these additions:

- An option is added to convert FS2000/CFS2 wind turbulence to wind "variance", which at least seems to do something [*actually it provides wind direction variations*], whereas the turbulence options seem ineffective (as least in FS2000).

- The random cloud turbulence option now limits the amount of turbulence generated according to the cloud base altitude above ground level (actually, above reporting station altitude, where known). Below 2,500 feet the turbulence is kept "light" at maximum. Below 6,000 feet severe turbulence is not allowed. Neither restriction applies to thunder clouds, which will normally contain moderate turbulence at a minimum.

- A facility is added to keep the electrics going when they are running on battery and it runs flat. This is to get around the rather quick battery discharge on the FS2000 airliners.

- IPC offsets are extended to include the range 0x4000–7FFF. This area contains no useful data at present, but parts may be allocated *on request* for use by third party programs, and used for further extensions to FSUIPC's facilities as needed. This extension is also supported by WideFS versions 4.20 and later.

- For FS2000/CFS2 the value of the aircraft's zero fuel weight is now accessible, in pounds x 256, via IPC offset 0x3BFC (as a 32 bit integer).

- Details of more efficient methods for using FSUIPC's IPC interface from within FS (such as from Gauges and other Modules) are now included in the FSUIPC SDK.

Version 2.11 contains some important fixes and improvements, which are probably all invisible to the user!

- The call made by FSTraffic to get the current surface wind is intercepted and the response set to provide FSTraffic the correct surface wind even when Wind Transitions are being used.

- FSUIPC now detects the actual local weather implemented at the aircraft position, not just the METAR-stipulated local weather at the three nearest reporting stations. When local weather is in use, FS2000 is constantly interpolating between neighbouring weather station reports, so it is changing slightly all the time the aircraft is moving. FSUIPC now reports this changing weather more accurately for the use of external programs.

- A bug is fixed which prevented the engine combustion flags being cleared to zero when the engines stop.

- A serious bug is fixed which could have caused some very odd weather effects to occur when an unusually large number of temperature layers are set. For example, 16 or more layers would have made the implemented visibility change and not reflect the values being set.

- The facilities to control the jet engine starter switch and prop plane magnetos/starter switch, through the original FS98 offsets, have been improved to work well on all four engines for FS2000 jets and prop aircraft. They are also usable on FS98 aircraft transposed into FS2000, but the FS98 prop plane magneto settings are still wrong. The latter is a problem even using mouse or keyboard (without FSUIPC installed), and I've not been able to find a way around that. Application programmers need to read the notes alongside the appropriate FS98 offsets in the SDK's Programmer's Guide (revision dated 15th January 2001 or later needed).

- Cloud turbulence was reported in the FS98 interface, for weather *readers*, as at a maximum all the time. It now reads correctly. *[This was supposed to have been corrected in Version 2.01, but apparently it wasn't]*.

- FSUIPC now detects other copies of itself in the Modules folder, during the FS loading sequence. If it finds any *earlier* versions it displays a message detailing the problem and its own filename and version and that of the (older) offending version, and, when this is acknowledged, terminates itself. This will leave the older version(s) still running.

  If it finds another version which has the *same* version number as itself, it does the same if it isn't the first in the folder. If it finds a *later* version, it does nothing as it can then safely assume that the later version will provide the warning and will terminate itself, leaving this one running okay.

- The original FS98 offset to allow the engine to be failed is now made to work in FS2000 as well, with an extension to select any or all of the four engines to be failed/fixed.

Version 2.10 fixes are few more rather odd things reported since version 2 was released:

- As a work-around for some add-in modules which seem to be adding their Menu entries to FS2000 in a rather unorthodox or erroneous manner, this version of FSUIPC delays creating its additional IPC window until after hooking the main FS2000 window. This 'solution' was determined by experiment, not by scientific deduction, and the reason merely changing the order in which things are done in FSUIPC affects how other independent modules behave is not clear—it is probably an indication of some incorrect assumptions, or use of un-initialised variables, in those modules.

- Further on the subject of Menu entries, facilities to specify exactly where FSUIPC adds its menu entry are provided in the INI file. Details are published in the Advanced Users document.

- The IPC interface can now be used by applications to specify Hot Keys and see indications of when these are pressed whilst FS has the focus. Full details are included in the revised FSUIPC developer Kit, published simultaneously.

- The IPC mappings of the Pause Control and Pause Indicator have been corrected to match FS98 correctly. Details are in the revised SDK.

- Minor other IPC mappings are changed to provide surface wind compatibility with versions of FSUIPC before 2.00.

Version 2.01 was brought out quickly after version 2.00 to correct a couple of bugs which, inevitably, crept past all the Beta testing. These are the fixes (plus a few of extra 'features'):

- The enhancements in FSUIPC to assist full light switching for FS98-compatible application programs ruined the lights control for some panels/gauges. This particularly affected strobes. This has been corrected by separating off the FS98 light control facility completely from the FS2000 global area.

- The tendency on some systems for the Options and Settings window to merely flicker on and off when selected has finally been fixed for good (I *hope!*).

- Facilities for WideServer to have all mapping, both for reads and writes, controlled by FSUIPC are incorporated. Previously WideServer used FSUIPC for FS2000/CFS2 writes, but had to take care of its own mapping for

reads. This duplication is now removed, making future maintenance and enhancement more straight-forward. WideServer version 4.01 is needed for this.

- The operation of the Vertical Speed correction (part of the "A/P Altitude Fix") is suspended whilst Project Magenta's MCP Enhanced Autopilot is operating. It seems that the way the MCP interacts with the FS autopilot can cause problems if the V/S sign is changed.

- Facilities are now included to allow users to move the FSUIPC menu entry to wherever they like in the menu system, renaming it or adding it as a top level menu entry. Full details are given in the Advanced Users document. This is primarily aimed at helping those who have other Modules which interact badly with the menu system. Moving the FSUIPC entry may help.

Version 2.00 includes a large number of changes, though many are fairly technical or invisible to the user. They are, in order of application:

- CFS2 support added

- Fixed a bug where upon a "clear weather" action, whether user triggered or not, FSUIPC may set "null" weather from the FS98 input areas even though no FS98 weather control program had yet provided any data for this.

- If the user presses FS2K's Clear Weather button, FSUIPC also clears its memory of any previous FS98-program weather data, so that FS2K will run its own local weather okay without it being overridden by FS98 weather from a program now not running.

- When the FSUIPC clear weather hotkey is used, the first time it restores any weather set by an external weather program (as before), but if it is used a second time without any intervening weather input, it clears down all previously set external weather too.

- Fixed an error in the thunderstorm option so that when a generated thunderstorm dissipates the accompanying rain is not also stopped every time. This allows the rain generation option, or external rain control, to continue normally.

- The type of aircraft being flown (prop or jet, mainly) is now determined more accurately, so that the correct set of gauge data can be obtained.

- Clouds created in FS2K's weather menu as global, or appearing as part of global weather set from downloading 'real weather' or running an Adventure, are no longer cleared every few minutes, or replaced by cirrus and/or jet trail layers when these latter options are enabled. This bug was introduced in 1.99, with the extension of the added cloud layer facility to FS2K's own global weather settings.

- The wind smoothing (part of wind transitions) can be set much more slowly than before: 1 knot or degree every so many seconds.

- The autopilot corrections for Vertical Speed (going the wrong way), and for the difference in calculation of target altitude from the altimeter reading, can be enabled or disabled on-the-fly, in the Settings dialogue.

- An error that, in some very unusual circumstances, could cause an "unsmoothed" wind speed and/or direction to be transiently set into FS2000, before normal smoothing is resumed, is fixed.

- Different FSUIPC.ini files can be used for differing FS2000 requirements, even loading from the same FS2000 installation. This involves using multiple FS2000.CFG files with different filenames, with a section added in each reading:

    [FSUIPC]
    ControlName=<name>

Then loading the different FS2000 configurations via:

    FS2000.exe /CFG:<filename>.CFG

will allow FSUIPC to identify its correct .INI file, i.e:

    <name>.ini

Note that the Log files, when logging is enabled, will also use this <name>, not just FSUIPC.log etc.

- The support for remembering undocked screen positions for FSNav3 is extended to cover FSNav4. However, when setting this up take care to undock the FSNav4 window in the first place using the Menu it offers, not its hot keys, or else FSUIPC may become out of step. Once it works it should continue working, but to reset it in case the window is lost, just delete the [FSNav] section in the FSUIPC.ini file before loading FS2000, and set it up again.

- Additional engine values are now made available for access by external applications. These are: Oil Temperature, Oil Quantity and Oil Pressure. Note, however, that some FS2000 aircraft (including the default B777) create values that may be too high to fit the 16-bit capacity for these in the old FS98 mappings. The B777's Oil Pressure is the main example. Apparently this problem can also occur with the Fuel Flow values already supported.

- An error is fixed which would cause the temperature layers in FS2000 to be re-built unnecessarily just because the surface temperature altitude is changed by the weather control program (this value is used to indicate METAR station elevation). This mainly prevents the weather logging looking odd, but may also help to prevent any transient temperature anomalies.

- If an external weather program provides a surface wind with a zero upper altitude, then a figure calculated as ground plus 2000 feet is assumed.

- When IPC logging is enabled, multiple successive identical reads or writes across the IPC interface are now not all individually logged. The first one is logged, then, before the next *different* entry, a count of the repeats is logged.

- Hydraulic pressure values, scaled using an estimated formula, are now made available to external programs.

- An option to "auto-tune" the ADF radio is available. This is selectable by setting "AutoTuneADF=Yes" in the .ini file. When FSUIPC detects no NDB signal being received it alternates the fractional part of the ADF frequency between .0 and .5 every 10 seconds or so. This allows external cockpits built with only whole-number ADF radio facilities to be used in areas like the U.K. which have many NDB frequencies ending in .5.

- If gusts in upper winds are suppressed, but all gusts are not, then there was an error in FSUIPC with surface winds extended upwards by the "Extend surface wind" option. The whole wind layer was then treated as an "upper wind" and so gusts were suppressed. This is now fixed so that gusts are allowed but only in the lower 2000 feet.

- The autopilot vertical speed correction now does not take effect if the target altitude is at or below ground level, or zero, whichever is the higher.

- Control of the FS2000 lights via original FS98 offsets at 0x280, 0x281 and 0x28C is improved. However, for full individual control of all FS2000 lights, programmers are recommended to use the individual bits at offset 0xD0C.

- Successive settings of zero surface wind data by the external weather program are ignored, and not allowed to interfere with other weather data being set from FS2000 sources or via the Advanced Weather Interface.

- The slew control flag offset is now correctly mapped for reading as well as for writing.

- Additional FS2000 switches can be read and controlled through special offsets, as follows:

byte	0x3100	Engine primer (write non-zero to operate, this is a one-shot)
byte	0x3101	Alternator (1 = on, 0 = off)
byte	0x3102	Battery
byte	0x3103	Avionics
byte	0x3104	Fuel pump
byte	0x3105	VOR1 morse ID sound
byte	0x3106	VOR2 morse ID sound
byte	0x3107	ADF morse ID sound

- Additional FS2000 radio and autopilot status indicators (read only access) are provided through a 16 bit word at another special offset, thus:

  word   0x3300 Navaid flags, bits allocated (set when true):
  - 0 = good COM
  - 1 = good NAV1
  - 2 = good NAV2
  - 3 = good ADF
  - 4 = NAV1 has DME
  - 5 = NAV2 has DME
  - 6 = NAV1 is ILS
  - 7 = AP NAV1 radial acquired
  - 8 = AP ILS LOC acquired
  - 9 = AP ILS GS acquired
  - 10-15 reserved

- External inputs to the rudder, aileron and elevator axis offsets via FSUIPC are now subject to a range check, and scaled down if this range is exceeded. The correct limits are -16383 to +16383. Additionally, axis inputs can be scaled upwards to meet this extent, if required. To do this set:

  AxisCalibration=Yes

  With this option, by default some flattening is applied to the values so that the response is not so vigorous near the centre (0). To calibrate the axes you must move all three controls to their maximum extents on each fresh load of FS2000. Alternatively, you can set "AxisCalibration=Set". This operates as above, but adds a new section to the .ini file, thus:

  [AxisCalibration]
  Rudder=<max>,<slope>
  Elevator=<max>,<slope>
  Aileron=<max>,<slope>

  The <max> values are those which are scaled to 16383, whilst the <slope> values control the amount of flattening in the centre: from 0 (no flattening) to 100 (maximum flattening. Note that the flatter the centre, the steeper the sides, so it is always a compromise. The defaults are 50, 40, 40 respectively, for the three axes.

  Once this calibration has been done and the section in the ini file, produced (or added manually), there is no need to re-calibrate on each new FS reload. The "AxisCalibration" parameter resets to "Yes".

  Note that the "AxisCalibration=No" setting is equivalent to setting "Yes" and adding the section:

  [AxisCalibration]
  Rudder=16383,0
  Elevator=16383,0
  Aileron=16383,0

  However, if these values are exceeded during an FS2000 session, the new maxima will replace any values in the ini file.

- Fuel flow values fixed for gauges using the PPH_SSL value instead of the more usual PPH and GPH values.

- The .ini file options for AnalogMapping, WeatherControl and ControlMapping are now removed. they are no longer optional. And the other options cannot be changed for the UIPCMAIN window class.

- The DME distance and speed strings, readable at offsets from 0xC29, are now made more consistent in format, with either:

  nn.nsnnnsz (n=decimal, s=space, z=zero)

  for each DME distance and speed, or, where the distance is over 99.9nm

  nnn.snnnsz

- Prop plane Magneto and Starter control, through the FS98 offsets, now works correctly for FS2000 aircraft and panels.

- Inputs across the FS98 offsets which need FSUIPC to call routines in FS2000 to trigger changes are now discarded when those inputs are attempting to set something already set.

- FSUIPC now includes a facility to send keystrokes to FS2000. For this to operate correctly the PC must be using Windows 98, ME or 2000. The facilities used do not exist in Windows 95 nor, I think, in NT. The feature operates through new special offsets, as follows:

  dword   0x3200   message (WM_KEYDOWN or WM_KEYUP)
  dword   0x3204   wParam for the message
  dword   0x3208   lParam for the message

  All 12 bytes must be written in one IPC write. This feature is used in WideClient version 3.998 and later, when the [User] parameter "SendKeyPresses=Yes" is included in its .ini file, to relay all non-system (i.e. no Alt key) key presses it receives to the WideServer host.

- For FS2000 and CFS2, the Settings and Options dialogue is completely revised as a Property Sheet, with multiple pages. This is primarily so that it can be developed and expanded in the future, but the opportunity has been taken to include all but the most obscure and unused options and make them run-time configurable. In particular it now sports a method of setting the optional Hot Keys in a more intuitive way.

- The two word offsets at 0xe78 and 0xe7a, used by FS2000 when controlling visibility through clouds, are now protected from writes through the IPC interface.

- Additional facilities are added to enable IPC programs to easily detect the version number of FSUIPC, and the specific Flight Sim it is running within. These are obtained by reading specific locations:

  > 0x3304 WORD Main FSUIPC version, as BCD x 1000: e.g. 0x1998 for 1.998
  > 0x3306 WORD Interim build letter, 0=none, 1-26=a-z: e.g. 0x0004 = 'd'
  > 0x3308 WORD FS version. Currently only one of these:
  >> 1 = FS98
  >> 2 = FS2000
  >> 3 = CFS2
  >> 4 = CFS1 (if supported)
  >> 5 = Fly! (if ever supported)
  > 0x330A WORD fixed read-only pattern 0xFADE. Use to check that above are valid before using them.

- Fuel pressure values are filled in by FSUIPC in the FS98 offsets. However, at present these values are a direct copy of the "PSF" (pounds per square foot) values provided by FS2000. I cannot determine what FS98 values should be: the default FS98 Cessna seems not to get any value set.

- The different window classes (FS2KMAIN, UIPCMAIN, FS98MAIN, MSCFSMAIN) are no longer fully supported on all platforms. The parameters for these are not automatically included in the FSUIPC.INI file (but if they are there they will be obeyed *except* for UIPCMAIN). Only the FS98MAIN window class is fully supported. FS2KMAIN will operate as a straight-through interface for FS2000 only, and MSCFSMAIN will do the same for CFS2, but their use is discouraged except for exploratory purposes.

- Minor changes have been made to stop FSUIPC crashing when installed into CFS1. These crashes were due to all the extra features in FS2000, and even CFS2, which FSUIPC now takes full advantage of. FSUIPC should now run in CFS1, and even provide useful information to FS98 programs (though there's no weather features at all), but I cannot go so far as to say that it "supports" CFS1 to any great degree.

- Keystrokes directed to the normal FS98 and FS2000 window ("FS98MAIN") are now relayed to the current FS window where this is different (as for instance in CFS and CFS2, where the FS window is MSCFSMAIN).

- The taxi wind facility is augmented by an "Automatic" option. When this is enabled, FSUIPC automatically engages the 1 knot taxi-wind whenever the plane is on the ground, but transitions this (according to the wind smoothing settings) to the correct wind after take-off.

- The "SetFSNav" facility is now defaulted OFF rather than ON to avoid problems with new versions of FSNav as they come out.

- The offset mapping across the IPC interface is improved in a number of areas, allowing an even greater degree of compatibility with FS98 to be achieved. Previously un-obtained values such as Cylinder Head Temperature are also now obtained, where calculated, and values too large for the FS98 capacity are limited to the maximum rather than allowed to wrap.

- The storm generator has the surface temperature as another user settable condition, with the default requiring 10 degrees Celsius as the minimum. Values can be set from –99 to +99.

Version 1.99 includes these changes:

- An option is provided to prevent the FS2000 Flight Plan loader re-positioning the aircraft. This option is *not* defaulted on, but if required it must be selected by changing a parameter ("PlanLoadNoPosition") in the FSUIPC.INI file from "No" to "Yes" and reloading FS2000.

- The jet trails and cirrus cloud layer options are now extended so that they operate even without an external weather program sending cloud changes. The application and layer changing is infrequent (every 5 minutes or more) in order to minimise graphic flashing effects, but applies to any weather source except FS2000's own local 'real' weather. Previously these optional layers were only added when clouds were actually changed by an external program.

- The jet trails layer, when added, is now only 1 metre thick, to try to prevent odd cloud effects at that level. Similarly the optional cirrus layer is now 10 metres thick.

- For FS2000 'real weather', if the search for the nearest ICAO station succeeds but the weather file contains no weather for that station, FSUIPC now assumes that global weather is set, instead of reverting to the nearest alternative with valid weather. This seems to accord more with what FS2000 is doing.

- The surface temperature altitude is now partially treated as being signed rather than unsigned (as it was in FS98), so that when this is used to signify the weather reporting station's elevation to Adventures the arithmetic for calculating AGL cloud bases works correctly for METAR stations below sea level. There's a limit: only values over 65000 metres are assumed to represent values of (x–65536) metres, so this will cope with reporting stations down to about 1,758 feet below sea level.

- Wind transitioning and smoothing is now performed synchronously with the other FS2000 functions, though it is still controlled by a separate asynchronous thread. This may relieve some of the pressure on busy memory or graphics operations so, hopefully, lessening the probability of crashes.

- An optional (but defaulted) patch is applied to SIM1.SIM (the main aircraft simulating part of FS) to correct some inaccuracy in the autopilot's altitude holding capability. The inaccuracy occurs when flying Flight Levels and increases with the difference between the altimeter setting (e.g. the standard pressure setting of 29.92" or 1013mb for Flight Levels) and the actual barometric pressure at sea level (QNH). The correction can be disabled by setting "PatchSimApAlt=No" in the FSUIPC.INI file.

- The same option (to improve the altitude holds) also corrects the vertical speed setting if it is set to climb when the aircraft would need to descend, or vice versa. It does this by inverting the sign of the vertical speed setting. It only does this when altitude acquire/hold is enabled, so that vertical speed control by itself is not affected. The correction is also not applied if the target altitude is set to a value over 65000 feet—a trick being used by some panels to provide V/S controlled ascents and descents.). Note that this improvement is also disabled by setting "PatchSimApAlt=No" in the FSUIPC.INI file.

- An error is fixed in the Advanced Weather interface. This could, in certain unusual circumstances, have caused FS2000 to crash or hang. The circumstances were only likely to arise when loading complete weather sets from WX files using the WeatherSet utility.

- Recent changes designed to fix EGT and other gauges in FS98 prop panels had the side effect of spasmodically causing FS98 jet panel EGT gauges to stop working. This is more likely when FS98 gauges are used with FS2K AIR files, and such gauges would not work at all without some action by FSUIPC. In this version the prop panel fix is made dependent upon the aircraft being a prop, so the previous operation of the jet EGT gauges is restored.

- FS98 global offsets for reading throttle, propeller pitch, mixture and starter switch settings for all four engines are now mapped into the PANELS data memory to obtain the correct values. Writing to these offsets still invokes a procedure call into the Panels interface, as writing direct to the correct data area does not, in itself, make the simulator change the operating values. (This is the only change also needing a corresponding change in WideFS, so producing WideFS version 3.99).

Version 1.98 includes a number of quite important enhancements and corrections:

- A correction has been made to the weather handling to cope with an unusual FS2000 local weather scenario which could have made FSUIPC crash FS2000 on rare occasions.

- The correct values for use in FS98 type gauges (and external programs through the IPC interface), when using an FS2000 AIR file, are now found for Fuel Flow (PPH), EGT and Torque percentage. These changes mainly apply to props and turboprop types, not really well catered for by previous versions of FSUIPC.

- Additional FS2000 global locations have been found and mapped, including the one which enables the VOR/ADF tuning to take effect after the frequency has been changed by an application.

- The Jet Trail facility is corrected so that both 1 *and* 2 okta Cumulus layers provided by the external weather program are eliminated, thus avoiding spurious jet trail layers at incorrect altitudes. The 1 and 2 okta cumulus layers are changed to stratus rather than increased to 3 oktas coverage, which would change the ATIS description from Few to Scattered. In addition the jet trails icing setting is now made zero, avoiding the silly result of icing occurring just because the aircraft passes through the same *altitude* as the few jet trails that can be seen.

- Changes have been made which stop FS crashing on loading on Windows 2000 when Force Feedback joysticks are installed and the FF is enabled. There is also a possibility that these changes might make FSUIPC work okay on Windows NT, but this has not been verified.

Version 1.97 allows Adventures to control precipitation using the extra FSUIPC variables, without having the results overridden by FSUIPC's semi-random rain and snow generation. The latter is optional, but defaulted on. The only proviso is that the adventure must refresh or change the precipitation at less than 30 second intervals, otherwise FSUIPC will assume it has finished and will re-enable its own rain/snow system if it is selected.

Also the optional extra cloud layers for 'jet trails' (for FSClouds2000) and cirrus are now generated in a slightly different way. First, each time there's a change of altitude in the cloud below, there's a separate 1 in 5 chance for each of these two layers that they won't be added. This adds a little more variety. Also the altitudes are changed. They are now never placed at less than 27,500 feet (for jet trails) and 33,500 feet (for cirrus). They will be higher than this if any 'genuine' cloud layer approaches these altitudes, and will have some random height differences from time to time as well.

Version 1.962 includes improvements to provide a better relationship between FS_Meteo (in particular) and Adventures. These are:

- The barometric pressure provided to adventures is now always the QNH at the aircraft. Differences between it and the current METAR setting from FS_Meteo (be this for the current zone, or the Destination) are provided in the Barometric Drift variable. Adding the Drift to the Pressure gives the METAR value for ATIS reports.

- Facilities to provide surface wind gust speeds to adventures are now provided. These speeds are set to the surface wind "turbulence" variable as there is no provision for gust data. Zero indicates no gusting. FS_Meteo can set a separate gust speed for destination weather.

Version 1.961 contains further improvements and corrections to the Adventure weather interface, concerning the settings for cloud base and cover in other weather zones than the current one (for example, to set destination weather). This is currently specifically suited to version 4.77 (and later) of FS_Meteo.

Version 1.96 includes the following changes:

- Added facilities for semi-random thunderstorm generation, based on wind and cloud values.

- Added a facility to increase the layer boundaries for winds by a fixed amount (default 2000 feet), to cater for weather control programs which set the upper altitudes too low.

- Added a facility to insert a $1/8^{th}$ cover cumulus cloud layer, so that Jet trails will be generated by FSClouds 2000. The other layers are prevented from being only $1/8^{th}$ cover when they are cumulus type.

- Reduced the frequency of random cloud turbulence and icing adjustments, in order to try to reduce the amount of cloud flickering (caused by FS2000's strange re-drawing methods). Additionally these parameters are now *not* changed each time an external weather program refreshes the cloud layers.

- Random turbulence and icing changes are now made by incrementing and decrementing by one unit each time, rather than in sudden jumps—*except* when a generated thunderstorm starts, when cloud turbulence is always increased to at least 3.

- The minimum visibility value is removed from the Settings Dialogue (though still adjustable in the .ini file). It is replaced by a split 'surface visibility' maximum value: one for "cloudy" weather and one for "clear" weather (the latter meaning, here, no cloud layer more than 2/8ths cover, so allowing jet trails and wispy bits). This allows a higher visibility to be set when, perhaps, blue skies (or stars) may be seen.

- Assorted improvements and corrections have been made to the Adventure weather interface, especially to suit version 4.77 (and later) of FS_Meteo. One of the more important ones to note is the correction of the adventure-reported surface wind direction to degrees Magnetic rather than True. (This problem wouldn't have occurred with previous versions of FS_Meteo).

- The additional IPC access to FS2000 values is extended to provide VOR and ADF station identifier and name strings. (This also affects FSlook2, included, and the change is also made to WideFS with effect from version 3.975).

- An internal interface for weather reading and writing has been added, for use by WidevieW, so that weather on separate LAN-connected PCs, all running FS2000, can be efficiently co-ordinated.

- The Outside Air Temperature (OAT) is now updated at offset 0x0E8C, just as in FS98.

Version 1.95 includes the following changes:

- The facility for random rain or snow in FS2000 has been improved to make the starting and stopping probabilities more realistic.

- The new FS2000 Adventure (APL) variables:

      AUTOP_AIRSPEED
      AUTOP_MACH
      AUTOP_VERTICAL_SPEED

are made to work correctly by additional patching to the ADVDRV.DLL module when FSUIPC is loaded. These variables can now be read and written from adventures. Some small rules need to be observed, but these are reasonably logical:

(a) The vertical speed hold needs to be enabled *before* actually setting the V/S value, as otherwise the latter seems to get immediately overwritten;

(b) Mach and Airspeed controls are mutually exclusive. The hold for one must be reset before setting the hold for the other;

(c) Mach and Airspeed holds are not enabled unless the Auto-throttle is armed (very sensible! <G>).

Version 1.94 includes the following changes:

- Corrections to the Engine variables EPR and Engine Vibration for FS98 aircraft, and EGT and Fuel Flow for FS2000 aircraft (all in FS2000 of course).

- Support for the "combustion" flag for FS2000 aircraft.

- Support of FS98 light control and read-outs for FS2000, covering Nav, Strobe and Landing lights. (Note that the Nav and Panel lights are actually separately controllable in FS2000, but not in FS98, so the FS98 "Nav" light control has been made to operate both in FS2000).

- Additional weather options in FS2000, providing facilities for random turbulence and icing in clouds, and turbulence in winds. Plus facilities to suppress all gusts in all wind layers, and to stop external weather control programs changing the options when central control in FSUIPC's dialogue is required.

- Access provided for many FS2000 specific "token variables", through a new range of offsets (2000–3FFF hex). Please see the "FSUIPC for Programmers" document inside the separate *Other Stuff* Zip file. There's also a utility program there, *FSLOOK*, which can be used to examine these values.

Version 1.93 includes many improvements, although these will be mostly invisible to the user. These all relate specifically to using FSUIPC with FS2000. They are:

- A bug is fixed that could crash FS2000 when an external weather control program tries to set a visibility layer and the current settings in FS2000 include multiple visibility layers (possibly a remnant from earlier versions of FSUIPC).

- If FSUIPC.dll is run without an existing INI file it defaulted the maximum surface visibility to 200 (2 miles) instead of 2000 (20 miles). This problem would be corrected as soon as the options dialogue was used to "restore defaults", or just change or confirm the setting (displayed as 2000), but it was disconcerting to say the least. This bug is corrected in this version.

- The values for EGT, Fuel Flow, Engine Combustion, EPR and Engine Vibration are now all derived more reliably, thanks to some information in the Microsoft Panels SDK. (However, it should be noted that the EPR, in particular, is not always available. It seems to depend upon the aircraft. For instance the default 737 seems to have no EPR calculated that I can find, whilst the 777 does).

- Problems such as infrequent crashes whilst changing aircraft or panels, arising from asynchronously servicing weather updating messages from WideServer.dll, have been resolved by forcing the actual updates to take place in the normal FS synchronous time steps.

There are also a number of improvements made to the Advanced Weather Interface (AWI), as follows:

- Overlapping cloud layers supplied through the AWI are removed.

- A visibility upper altitude of zero specified via the AWI is replaced by the default surface layer upper altitude. This is 6000 feet unless altered in the FSUIPC.INI file.

- The "ExtendMetarMaxVis" facility is applied to visibilities set via the AWI.

- Clouds specified through the AWI with zero coverage are removed.

Version 1.92 contains an important error correction plus some lesser improvements, and one new facility:

- A bug in the new graduated visibility option prevented the visibility being changed by user or external program action unless the upper visibility altitude was also changed at the same time.

- Additional actions are now taken by FSUIPC to try to prevent an odd visibility 'flicker' effect sometimes occurring when coming out of clouds. It seems that FS2000 tries to assert the "unlimited visibility" value (the one set in its Display Options) when emerging from clouds, instead of the value specified in the dialogue for the current altitude. FSUIPC now spots this and corrects it immediately.

- FSUIPC now remembers the undocked position of FSNav's window. This is primarily of use to FSNav users with two or more monitors, who like the FSNav map to appear on their second monitor screen. FSNav itself doesn't remember this so it otherwise needed setting every time you run FS2000. (Note: this is for FSNav version 3.00, in FS2000. Whether it would work with other versions, or on FS98, is not known).

- The Log switches in the FSUIPC settings dialogue now behave a little more rationally.

- Some minor changes have been made to the Advanced Weather Interface and how it interacts with weather specified through the old FS98 interface. These changes also affect WideFS, so WideFS version 3.94 or later should be used with FSUIPC 1.92.

Version 1.91 has major changes in the way FS2000's visibility is handled. The facilities to automatically generate multiple visibility layers are scrapped completely—they didn't work consistently in any case—in favour of a

dynamic system of 'graduated' visibility values. This works more smoothly, more consistently, and applies equally to externally controlled weather and downloaded real weather.

The only other changes in this release are:

- The "thinness" of thin clouds is now defaulted to 1000 feet (instead of 500 feet), and is made adjustable—but only in the .INI file, not in the dialogue.

- If the top winds extended by the "extend top wind layer" option are actually the surface winds (as will be the case for downloaded real weather), then gusts are removed as well, *unless* upper wind gusts are allowed.

Version 1.90 was a major update with some serious errors corrected and a number of facilities added, all in response to requests from users. The changes were:

1. Fixed a bug which crashes FS2000 if ever the weather is updated and the ICAO table is not in memory. This seems a very unusual occurrence, but it did happen once.

2. If the FSUIPC Settings and Options dialogue is used and the *Restore defaults*, *Start New Log* or *Stop Logging* buttons are used, then thereafter FSUIPC will not process FS2000 weather. Only a restart of FS2000 fixes this condition, once it occurs. This is fixed in 1.90.

3. The Hot Key facilities now work correctly in Full Screen mode. The problem in previous versions seems to be a function of the Windows hot key feature. In 1.90 this is not used. Instead the keyboard input to FS is intercepted. This also means that the Hot Keys only work when FS has the keyboard focus.

4. FSUIPC now uses FS's own memory allocation system when it needs working memory. This should reduce or even eliminate the exit crashes experienced occasionally in previous versions.

5. The dialogue for options and settings has been extended to show two buttons for taxi winds—one to turn them on, and the other to turn them off, with the non-applicable one obviously disabled. This should make it much clearer what the taxi wind status is at the time.

6. The wind smoothing action (part of wind transitions) is now applied to FS2000's downloaded real weather ('local weather'), smoothing the changes between adjacent METAR reporting stations.

7. The extension of the top layer of winds upwards is now done for all three candidate METAR stations when the option is enabled and FS2000 downloaded real weather is in use. This should stop the extension occasionally disappearing, which happens when FSUIPC and FS2000 identify the nearest METAR station at different times.

8. The external control facilities for FS2000 Left, Right and Parking brakes now work exactly as they did in FS98, as far as I can tell so far (with limited testing, unfortunately). I still can't get the Arm Spoilers feature to work, however.

9. A facility has been added to limit the overall maximum visibility that can be set. This operates on all weather sources. If multiple visibility layers are specified, the graduation across layers is from the set (or maximum) surface visibility at the lowest layer, up to the overall maximum at the highest layer.

10. The surface wind can be limited to a specified speed in knots. This applies to weather from any source.

11. To assist in getting better performance on slower machines, facilities have been added to restrict the number of cloud layers to one, at most, and (independently) to limit the thickness of any layer to 500 feet at the most, not allowing for variations in base and top.

12. Facilities have been added to the Advanced Weather Interface to allow an external weather program to provide specific weather data to be supplied to adventures, and *not* to the simulator. This is to allow ATIS reports to be generated correctly even whilst the weather program is transitioning the weather, or possibly simulating weather for a different METAR station to the one at which the ATIS is requested. [*Note that at the time of Release these facilities had not been thoroughly tested*].

Version 1.81 was a quick bug-fix for 1.80, correcting the one inevitable serious bug reported immediately after Release but never picked up in hours upon hours of testing beforehand! (This is a variety of Murphy's famous law, I believe). This particular bug occurs if your are running with Wind Transitions disabled (which most unfortunately is the default!) *or* you happen to be using downloaded 'real weather' (when wind transitions aren't operating in any case) and you then visit the new FSUIPC options dialogue. After this, one of the main routine's in FSUIPC gets locked out in such a way that incoming weather changes (from external weather control programs) are never again processed, and neither are the FS98 global locations for weather data filled in.

Version 1.80 was a major release with a number of fixes and new features, as follows:

All of the interesting weather control options, and also the logging facilities, can now be accessed and changed 'on the fly' through a new dialogue window, accessed via the Modules menu then 'FSUIPC' (key ALT, M then F). In FS98 this merely gives version information.

1. The wind transitions feature, when enabled, now operates on all weather types except downloaded local weather (where it wouldn't be of much use anyway, as there's no upper winds in that mode). Before this version wind transitions only applied to weather arriving from an external weather control program.

2. Flights saved when wind transitions are in effect are now saved with all the original wind layers, not the single wind layer in effect because of the way transitions are handled. This swapping action is done invisibly without actually affecting the simulated weather in force.

3. The top-most FS2000 wind layer is now optionally extended to operate up to 100000 feet. This is primarily to assist in the downloaded 'local weather' mode, where there is only a thin surface wind layer and no winds above.

4. In FS2000, multiple visibility layers can now be applied to **all** weather sources, with an adjustable number of visibility layers from 1 to 10. Combining this with a limited maximum surface visibility gives better frame rates at lower altitudes without compromising distance views at cruise levels.

5. The automatic cirrus layer generation can now optionally be forced to operate even if the weather control program in use disables that option.

6. A weakness in the way some engine values were obtained for external programs to read could give rise to occasional FS2000 crashes when changing aircraft. This has been fixed.

7. Several bugs have been fixed in the Advanced Weather Interface. As only my own WEATHERSET program currently uses this, I won't go into details here. But use the supplied new WEATHERSET with this version of FSUIPC.

Version 1.74 was a limited release with two small changes:

1. Changes to the logging, simply to prevent redundant or continuous multiple log entries for WeatherOption changes and METAR visibility overrides, especially noticeable when FSUIPC is used with FS_Meteo.

2. Fixes to the "AutoClearWeather" facility so that if FS2000 downloaded weather is in operation and a Weather Control program is then started, the local weather is not only cleared, as before, but the initially supplied weather from the weather program is correctly applied. Before this change, the weather would be cleared correctly but the weather program's settings would be lost until the next refresh, whether user forced or by time or position changes.

Version 1.71 was produced *very* quickly after 1.70 to correct one serious problem reported in 1.60 *just* after the Release of 1.70! The problem was that the "AutoClearWeather" option (which defaults on) was so enthusiastic that it also reset downloaded weather if the FS2000 'real weather' engine even momentarily ventured outside an ICAO reporting station area and so temporarily engage 'global' weather.

Version 1.70 includes some relatively minor yet probably important changes, and is released simultaneously with an update to the WideFS package (now at version 3.70). Here is a summary of the changes in FSUIPC:

1. Ridiculous wind speeds sent to FS2000 (using the FS98 offsets) are now trapped and either ignored or limited. Parameters to control the actual limits are provided. This feature is a stop-gap measure to compensate for the occasional corruption of wind data supplied by SquawkBox.

2. The visibility set by FS98-compatible weather control programs is now (optionally) extended when the value supplied suggests that the program has read a METAR and interpreted the maximum visibility value literally. Metric METARs indicate 9999 metres (6.2 miles) *or more* by the value "9999", whilst the U.S. METARs indicate 10 miles *or more* by the value "10SM". Really the weather control programs should adjust the value to some figure above this, most of the time at least. However, since they often don't FSUIPC now contains the facility and this is enabled by default. Weather control programs which do work this out can turn the option off automatically.

3. An error in the weather logging which caused FS98 to crash is fixed.

4. The Fuel Flow (PPH) value found for FS2000 aircraft is now copied to additional FS98 locations to assist those programs, such as Enrico Schiratti's PFD.EXE, to show it correctly. The value is in doubt, but it is as close as I can get at present. The previously updated locations apparently only really assisted the gauge token variable interface, as used in EPICINFO.DLL.

5. Taxi winds are now only applicable to the lowest wind layer. Attempts to switch taxi winds whilst the aircraft is effectively in some other wind layer are ignored, and will generate a "beep" in warning. Also the use of the taxi wind hot key is logged, if logging is in operation at the time.

6. An additional hot key facility is provided, to stop logging if it is enabled.

Version 1.60 was the first major release for a while. These were the main changes:

1. Approximately once a second FSUIPC checks for the "stuck visibility" problem. I've determined that this is caused by WEATHER.DLL somehow failing to update its effective visibility after passing through clouds. The effective visibility is actually stored in global offset 0xE78, with a target value in 0xE7A. FSUIPC checks whether the aircraft is between clouds, allowing for deviation both top and bottom. It does this for ALL cloud layers, not only those specifiable through the FS98 interface. If it is, and it finds that the effective visibility is below the target, *and* it stays this way for 3 seconds, then it halves the difference: i.e. it gets the 0xE78 value closer to the 0xE7A value each time. So it might actually take several seconds for the visibility to gradually clear. This approximates to what WEATHER.DLL usually does (and should be doing, if it didn't get 'stuck').

   This action can be turned off by "ApplyVisFix=No" in the .ini file. This is for when MS fix it! <G>

2. An "AutoClearWeather" facility, defaulting to "Yes", will automatically operate the "Clear All Weather" function in FS2000 if local weather is in force and:
   (a) An FS98 weather control program changes the weather, or
   (b) The "force weather" hot key is used, or
   (c) A "Clear All" command is received on the Advanced Weather Interface.

3. A "MaximumVisibility" parameter is added. This in not effective unless it is greater than the MinimumVisibility parameter. And both limits are now applied to ALL weathers, no matter how set. In other words, if you set a visibility of 30 miles in the dialogues, but the maximum is set to 10, you will see the visibility change to 30 only for a short time, before it is "fixed" by FSUIPC. (This facility was requested by folks with slower machines who wanted the ability to limit the maximum visibility below the 60 miles allowed in FS2000's display options).

4. Surface wind data is now correctly supplied to Adventures even when WindTransitions are enabled. The other wind layers are still not accessible to adventures when transitioning is enabled.

5. The surface temperature altitude is either set to the ground level, or to the elevation of the current METAR reporting station when real weather is being used. This enables adventures to calculate the correct AGL for cloud bases for use in ATIS reports. The same facility is extended to external weather control programs (i.e. they are invited to set the value at offset 0xF40 to the ground elevation of the METAR reporting station). Adventure writers should then use TEMPERATURE_SURFACE_ALT instead of ground altitude when computing cloud base AGLs.

6. When using downloaded real weather, FSUIPC now manages to identify the correct reporting METAR station *most* of the time. It also now finds its ICAO (which is logged if LogWeather=Yes), so it reports the correct data. If running, WEATHERSET will display the ICAO in its title bar.

7. The extra thread created by FSUIPC to operate some of its functions, such as the wind transitioning, is now closed forcibly when FS2000 terminates in an attempt to stop the FS2000 closing crashes reported by some folk.

8. An error has been corrected in the wind transitioning facility which would cause *negative* wind speeds to be set at aircraft altitudes below sea level, such as with a small aircraft at Schiphol. The results could be disastrous for those aircraft!

9. The Advanced Weather Interface supports an extra command, to request the details of the METAR reporting station responsible for the current "local weather", when applicable.

10. WEATHERSET version 1.40 accompanying this release includes many extra facilities including the display of the local weather ICAO code, and the ability to find local weather data in a saved .WX file.

Version 1.57 was a minor release with the only change being to one of the additional adventure variables, added for weather details. The original SYSVAR_B5 status indication is now a fixed constant, intended to be used in APLC32-coded adventures to check that FSUIPC is loaded before any access to the new variables is actually used. Martin Smith's APLC32 compiler, version 1.32, is released simultaneously and supports the additional variables with the new names listed later in this document.

The only **Version 1.56** change was that, at last, I think I've cracked the occasional problems in detecting Local (downloaded) weather settings correctly. This version appears, from all tests so far, to correctly detect when local rather than global weather is in force, and updates the appropriate weather data for applications (and adventures) to match.

Version 1.55 changes were:

1. Added the facility (defaulted on) to automatically apply a run-time patch to the variable table in the FS2000 adventure interpreter (ADVDRV.DLL) so that the FS98-compatible weather information is again readable in adventures. For more details see the section "Weather Data for Adventures" towards the end of this document.

2. Fixed a bug in the logging of "Reads" on the advanced weather interface. In error all commands (offsets) were logged wrongly—without the weather type digit or altitude value.

Version 1.50 changes were:

1. Fixed: a problem which caused FS2000 to crash on exit if the DLL was positioned in the Modules folder after certain other FS modules and the "WindTransitions" option was not enabled.

2. FSUIPC now only generates one visibility layer by default—an option is provided, instead, to generate the three as in previous releases. This change has been done just in case the multiple layers have anything to do with the intermittent stuck low visibility bug.

3. For the same reason, the base altitude for the lowest visibility layer is now set to 0.45 metres as it appears to be by FS2000's own weather settings, rather than 0 metres which seems more logical.

4. The FS98 "pause" flag location at offset 0264 are mapped to 0268 rather than 026C, where they were originally thought to be.

5. Weather data received through the Advanced Weather interface is now logged in full when the weather logging option is enabled.

6. Cloud turbulence settings (range 0-4) are now mapped correctly from the FS98 values.

WeatherSet version 1.1 is supplied with this release. It now includes facilities to read and save FS2000's own .WX files, and can be used off-line from FS2000 to read and display .WSD and .WX files. See the separate .txt file describing WeatherSet functions. WideFS users can use WeatherSet on a separate PC to FS2000, to avoid loss of keyboard focus (and hence sound) while accessing it.

Version 1.40 had many minor improvements, and small bug corrections (including handling of negative ground altitudes), but mainly it includes the first Beta test version of the promised Advanced Weather interface for FS2000. Version 3.40 of WideFS provides Network support for this interface at the same time, provided that WideFS and FSUIPC are used together.

In order to test the Advanced Weather interface, I did need to write one small application, "WeatherSet", which will display, modify, load and save weather data, and even print it out. This is enclosed for those who wish to have a play with FS2000 weather in interesting ways. Brief documentation for WeatherSet is enclosed in this package.

Version 1.30 included the following improvements and new facilities for FS2000 only:

1. The weather processing is now capable of finding and reporting on downloaded 'real weather', or "Local Weather". FSUIPC does *not* try to impose a weather control program's requirements when 'local weather' is selected, but it will track the application's weather changes. When the global weather is again selected (by clicking the "Clear All weather" button), the weather control program's requirements are automatically instated. (If you really do want to clear all weather, wait for it to settle, then do the Clear All Weather again).

2. A "Wind Smoothness" facility is added to prevent sudden swings in wind direction or speed when a weather control program changes METAR stations or makes some other change. This facility works in conjunction with external weather control programs and the optional Wind Transitions facility—see the Options section later.

3. An option to set a minimum visibility is added. This is only effective for external weather control, and is simply intended to prevent the visibility being set below the level at which an FS2000 bug seems to take over and prevent the visibility being raised again until FS2000 is reloaded. See the Options section for more details.

4. The current surface wind speed and direction are provided in new locations for programs needing this (e.g. for ATIS reports) even when the Wind transitions option is being used and the currently set 'surface wind' is the very thick single layer used for wind control. See the Addendum for Application Programmers for more details.

5. Provision is made for external control over many of the FSUIPC.INI file weather options, so that application programs needing specific options can set and clear them directly without having to rewrite the INI file.

6. Many assorted minor improvements and bug fixes have also been incorporated into this release. These include corrected gusts, taxi wind facilities, 'de-bouncing' of Hot Keys, and zero ambient wind reports above the highest set layer.

Version 1.26 was a limited test release with some bugs fixed in the setting of weather data in the FS98 'current weather' area, for applications to read. In particular: the cloud data was previously incomplete (being one layer short unless at least three FS2000 layers were set); the day/night temperature variation wasn't set; and the surface wind layer's upper altitude was wrong (AMSL instead of AGL) if the winds were only set manually, not by an external weather control program.

Version 1.25 was the second general release, and incorporates a very large number of improvements, mainly to the weather handling in FS2000. Particularly important changes include:

1. Correction to the temperature layers to abide by the external program's requests. Previously a fixed set of upper temperature layers was inserted.

2. Correction to the surface wind layer for magnetic deviation. FS98 expects this layer's direction in degrees magnetic, but FS2000 expects it in degrees true. FSUIPC now hides this difference so the same winds result from the same weather inputs.

3. Adjustment of the surface wind layer's reported upper altitude to make this appear the same as in FS98. In FS2000 the upper altitude is fixed and reported AMSL, whilst in FS98 it is reported AGL—with the surface wind actually following the ground contours. I think that, with the higher resolution of ground elevations in FS2000 this has been abandoned for performance reasons, so FSUIPC has to continually adjust the read-out, converting the fixed AMSL value to an AGL value that varies according to the ground elevation.

4. Gusts in FS2000 upper winds are now suppressed by default (though there is an option to let them through).

5. The FS2000 wind shear setting is now set to "sharp" by default, as the normal minimum setting, which should give a smooth transition, appears broken and sometimes generates wildly inappropriate transitional winds. With the setting on "sharp" the transition abides by the control program's requests.

6. Facilities added with specific "hot key" combinations, which are used for some degree of control whilst flying FS2000. One such can be used to force the FS2000 weather back to the most recent state supplied by an external weather program ("ForceWeatherKey"), and another to toggle the surface layer wind speeds back and forth between their requested setting and just 1 knot (with no gusts). This latter ("ToggleTaxiWindkey") is useful when the surface wind prevents taxiing through excessive weather-vaning. The speed of 1 knot is retained to ensure the selected runway doesn't change, and other programs like FSTraffic continue using the correct runway.

7. Some additional FS98 locations are now mapped onto their equivalent FS2000 locations, and optional facilities are provided for driving some other FS controls through the "trigger event" interface for Panels. See the "ControlMapping" option below.

8. All the input mapping which is done through the panels "trigger event" facility is now done only on the basis of received inputs from client programs, *not* by monitoring changes to the written locations. This prevents odd feedback type effects, such as possible stuck throttles.

9. The parameters provided in the FSUIPC.INI file are extended by a new [General] section through which a number of facilities can be turned on and off independently of the "Class Name" being used. Most of these are to do with weather generation and interpretation, but for program developers and debugging there are logging facilities as well. These are all described in later sections of this document.

10. Additional facilities for FS2000 cloud control, dew point and rain or snow are provided for weather control programs, as an interim step pending a full FS2000 weather control interface. These are documented as an Addendum for Programmers.

11. An FS2000 option is provided to enable the winds to be transitioned slowly across wind layer boundaries. This replaces the currently non-functioning slow transitions offered by FS2000, but it is not enabled by default since some FS98 programs may not expect such behaviour.

Version 1.10 was the first general release. Minor modifications have been incorporated since 1.04: in particular the ability to install itself into FS98 or FS2000 in such as way that it can still provide its services even if there are other IPC modules also installed.

Version 1.04 was the first restricted Beta release version. There were a very few isolated copies of versions 1.01–1.03. All of these earlier versions should be destroyed.