

X52 Pro Interface for FS9 Reference manual

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What is this piece of software?

Flight Simulators are my preferred games. Microsoft Flight Simulator is my preferred game for years (I'm using it since the version 2.0). When I have some time to spend, I power up my home computer, I plug my joystick and I make a flight between big or little cities, either in an ATR-72, An Airbus A320 or an Airbus A340.

Some days ago, as my old joystick was so old that it made lots of strange metallic noises, I finally decided to buy a new one. And I bought the best model accordingly to the reviews on the nerds sites on the web. This model was the X52 Pro Flight Control System from Saitek (and the Pro Flight Rudder Pedals also).

This joystick has many features, including a MFD (Multifunction Display, a 3x16 characters LCD screen) which delivers information about the current flight – under Microsoft Flight Simulator X – and which can be controlled using a dynamic-link library provided with the installation CD.

When I received this flight stick, I searched on the web and on the Saitek forum for a piece of software that would be able to interface the joystick with FS9. I didn't found any. I did found many people requesting for such a software, but nobody made the job for this purpose.

As I'm a professional developer, I decided to spend a week-end and some evenings to write this program, to be able to control my favorite flight simulator with my new favorite joystick.

A friend of mine, who also loves virtual flights, saw the results and told me that a publication of this program on the web would be great for other owners of this joystick. So, I opened a blog on a free site, using my common callsign, and here it is, you may now download and use this little program as I do myself when I have time to fly.

I hope it will be as useful for you as it is for me. And if you like it and use it, please feel free to write down a little comment, remark or suggestion on the blog, it will be nice!

The version 1.0 of the software was created in April 2007, and with some comments from the first users, it seems that pages were missing. The version 1.1 added three new features: one asked by the users, two because I found them useful, and another one because the basis material was found on the internet...

Version 1.2, published in June 2007, adds new features requested from the web site, some corrections and a new feature that permit to change the LED colors if the autopilot is engaged.

And future versions will add more and more exciting enhancements!

Frederic VALERY aka BlackSwift

Thanks, contributions, copyrights, etc

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FS Connect is copyrighted by Russel Dirks (e-mail: russdirks@yahoo.ca, http://www.dirks-software.ca) DLL module uses source code from FSMenu which is © 2004, Cyril Hruscak (cyril.hruscak@gmx.de) Hoping I don't forget anybody...

Installation

The program is developed using Microsoft Visual Basic 6.0 (my favorite tool for rapid development) and Microsoft Visual C++ 6.0 for the DLL module.

It uses the dynamic link library provided by Saitek to write down the information on the MFD, and also uses the FS Connect library to retrieve information from the running instance of Microsot Flight Simulator 2004.

The FSConnect.dll library is a fantastic tool developed by Russel Dirks which allows software developers to retrieve information about the current flight running in FS2004.

So, the X52 Pro Interface for FS9 software is just a piece of code that gets the FS9 information from one side to write it down on the MFD on the other side. Pretty simple.

In addition, the X52PI4FS9.dll library has been developed on the basis of the FSMenu source code by Cyril Hruscak. Its purpose is to start and stop the X52 Pro Interface for FS9 software when you start and stop FS2004, and to provide an access to the main window.

To install the software, just use the setup.exe file. This program will perform the needed steps, assuming that Microsoft Flight Simulator 2004 and the Saitek hardware and software have been installed.

The setup.exe program does the following:

- 1. It copies the FSConnect.dll file in the "Modules" folder of the FS2004 installation folder,
- 2. It copies the aaX52PI4FS9.dll file in the "Modules" folder of the FS2004 installation folder,
- 3. It copies the "X52 Pro Interface for FS9" software (exe file and ini files) in a folder of your hard disk,
- 4. It copies this documentation in the same folder than above,
- 5. It installs the Microsoft Visual Basic 6.0 runtime, if you don't already have it,
- 6. It creates a key in the Registry (in HKLM\Software\BlackSwift) to store the path to the exe file.

Once the installation of the files performed, you'll have to configure the program to tell it where the files are located and what options you want.

Configuration

To configure the software, open the INI file located in the program folder. This INI file is just a text file, you may use the Notepad or any text editor.

This file is a Windows profile file. It contains two sections, containing keys, and each key has a value. It also contains lots of comments (the lines beginning with ";").

Let's review the contents of the file: the first section, [General], contains the main parameters definitions. There are six parameters:

• **Write log** defines if a log file must be filled in with information concerning the software execution. This log file contains the time of all significant events that occurred, and some information concerning the hardware and software installation. The log file was very useful during the

development of the program and may be used in case of problem. The default value is 0 (zero) which means that no log file must be created. If set to 1, the log file will be created.

- **Log filename** defines the full path and name of the log file. This key is only used if the **Write log** key has been set to 1. The default log file is located in the installation folder and has the name of the executable file with the .log extension.
- **Timer tick** defines the amount of time in milliseconds between two timer ticks. Each time a tick occurs, the software checks out for the soft buttons pressed on the controller, and check out for important information to acquire or update. By default, the Timer tick is set to 250 ms (4 fps), but the value can be changed from 100 ms to 2,000 ms.
- **Refresh every** defines the amount of time between two updates of the MFD. It's not useful to update too frequently, as it consumes CPU time. Keep the CPU for the simulator to avoid a loss of fps in the game. **Refresh every** is the number of **Timer ticks** between two refreshes. The default value is 20 (so the refresh occurs every 5 seconds: 20 x 250 ms = 5,000 ms). The value can be changed from 1 to 240.
- **Boost mode enabled** defines that the Boost mode must be enabled at startup (if you have a fast computer) or not. The default value is 0 (zero) which means that the Boost mode is initially disabled. Set it to 1 to have the MFD refreshed every **Timer ticks** milliseconds.
- **Fuel in kg** defines if the fuel quantity must be displayed in kilograms or in pounds. The default value is 0 (zero) which means that the display is in pounds. Set it to 1 to enable the display in kilograms.

Please note that the **DirectOutput folder** key disappeared since the version 1.0 because the path to the DLL is now read directly in the Registry from the HKLM\Software\Saitek\DirectOutput key, DirectOutputX86 value. Notice also that the DLL name must be "DirectOutputX86.dll". It's a limitation of the used tool to develop the program (see the VB6 SDK I published on my web site to know why).

The second section, [Pages], contains keys corresponding to the pages you want to see on the MFD. You'll see later in this manual what pages are available, and what kind of information they contain. In this section, just change the value of the keys: set the value to 0 (zero) if you don't want the page to be displayed on the MFD, otherwise specify the page number you want to assign.

For instance:

[Pages] Aircraft=1 Location=0 AltHdgSpd=4 Fuel=0 COM=2 NAV=3 Weather=0

This series of values tells the software to display the following pages in this order: Aircraft information, COM frequencies, NAV frequencies and Altitude, heading and speed data. No other page should be displayed.

In version 1.1, this section accepts three new keys (described later in this manual): XPNDR, Checklists and Airports.

The third section, [LEDs], contains keys corresponding to the LEDs on the controller. Each key may receive a value indicating the color you want to assign to the corresponding LED. You'll see later in this manual the keys you may use and the values you can set for each. This section has been added for the version 1.1.

And, in version 1.2, it's now possible to change the color of the LED when the autopilot is engaged, allowing us to have a visual information about the state of this essential component of the plane.

The available pages

This section describes the contents of each available page and the actions you may perform on them. But first, let's specify the command buttons under the MFD on the joystick:

The wheel button on the left, called the "Function" button, allows you to change the page displayed on the MFD. This "Function" button is not handled by the software. It just works as it is defined in the Saitek manual.

The two buttons on the center are intended to be used to start/stop and reset the timer, or to select the time zone of the clock. These buttons are not handled by the software.

The "MFD Select" wheel button on the right, also called the *SoftButton* in the Saitek documentation, is handled by the software, and allows you to select and change the information displayed on the MFD.



Any changes performed on these data are automatically sent to FS2004. For instance, modifying the COM frequency on the MFD does also change the corresponding COM frequency in the simulator.

The "Aircraft" page

This page displays information about the current aircraft loaded in FS2004 and about the local time and Zulu time in the simulator. See on the bottom of the MFD picture below: the picture was taken on 03/27/2007 20:19, but in the Flight Simulator, it was 12:45 local time (GMT +1:00)



There are no data that can be changed on this page, so the *SoftButton* can't be used. You may use the "Function" button to display the previous or next page.

If the name of the aircraft is longer than the 16 characters of the MFD, it automatically scrolls to the left. It's one of the included features of the Saitek controller.

The "Location" page

This page displays the current location of the aircraft in Flight Simulator 2004: latitude (N or S) and longitude (W or E).



There are no data that can be changed on this page, so the *SoftButton* can't be used. You may use the "Function" button to display the previous or next page.

The "Altitude, heading and speed" page

This page displays the current altitudes in feet (MSL and AGL), the current heading in degrees, and the current speeds in knots (IAS and TAS).



There are no data that can be changed on this page, so the *SoftButton* can't be used. You may use the "Function" button to display the previous or next page

The "Fuel" page

This page displays the amount of fuel in pounds in the plane (FOB – Fuel On Board), and the consumption of fuel in pounds per hour (FF – Fuel Flow).



The "COM" page

This page shows the COM1 and COM2 current and stand-by frequencies. In this page you may select the radio to use, swap the current frequencies with the stand-by ones, and change the stand-by frequencies.

In this page, you may select and change the values of the frequencies, and these changes are immediately updated in FS2004. For this purpose, there is a ">" or "<" character in the page, in front of the radio name, in front of one of the frequencies or after the decimal part of the stand-by frequencies. This mark shows the information that can be changed. To move the mark, roll the wheel of the *SoftButton*. To change a value, click the *SoftButton*.

To change the active radio

As the active radio is the one with the "+" symbols (see above: COM1 is the active radio), roll the *SoftButton* until the ">" is in front of the inactive radio then click the *SoftButton*.

In the example above, after clicking while the ">" symbol is in front of COM2, the display will show "-COM1-" and "+COM2+". To activate the COM1 radio, you'll have to move back the ">" in front of "-COM1-" and click.



To swap the frequencies

Roll the *SoftButton* in front of the current frequency for COM1 or COM2, then click the *SoftButton*. The stand-by frequency appears in the current frequency line, and the current frequency appears in the stand-by frequency line.

To change the frequencies

The operation is a little bit complex, as you'll have first to tell the software that you want to "edit" the frequency before changing it, and will have to tell the software you finished the modification.

For a frequency, you'll be able to change the integer part (1 MHz increment or decrement) **OR** the decimal part (25 KHz increment or decrement), just as you do in the simulator.

The software tells you that you're in edit mode by changing the ">" symbol into a ">>" symbol, or "<" into a "<<" symbol (for the decimal part).

First, roll the *SoftButton* to the front of the stand-by frequency (to change the integer part) or after the standby frequency (to change the decimal part) and click on the *SoftButton*. You are now in "edit" mode, and the ">" (or "<") symbol is now ">>" (or "<<").

Roll the wheel of the *SoftButton* up or down, and the frequency value changes accordingly.

Once the correct value set, click again on the *SoftButton* to exit the edit mode. The ">>" symbol reverts to ">" (or the "<<" symbol reverts to "<"). By rolling the *SoftButton*, you may now select the current frequency or the radio names.

The "NAV" page

This page shows the NAV1 and NAV2 current and stand-by frequencies. In this page you may select the radio to use, swap the current frequencies with the stand-by ones, and change the stand-by frequencies. This page is exactly the same than the COM page.



The only difference between this page and the COM page is that there is always an active radio for communications, as there may be no active radio for navigation.

In the picture above, you can see that the symbol is located after the decimal part of the stand-by frequency of the NAV1 radio. So, at this time, the edit mode is enabled. Rolling the wheel of the *SoftButton* changes the decimal value of the NAV1 radio frequency.

The "XPNDR" page

This page, available from the version 1.1, displays the transponder and ADF values. You may change each digit independently and of course, the changes are immediately available in FS9.



The XPND value and ADF value show the current radios values in FS9. To change these values, use the digit selector under the digits.

You may select the digit you want to change by rolling the *SoftButton*. Once the selector under the digit, click the *SoftButton*. The selector aspect changes from a dash sign to an equal sign. Now, roll the *SoftButton* to change the corresponding digit. Once it is set, click the *SoftButton* again. The selector changes back to the dash symbol: you're ready to select another digit.

This page was requested by nico40, one of the first users of the X52 Pro Interface for FS9 program. Nico, I hope you'll love this page.

The "ILS" page

This page shows the ILS settings (NAV1 radio). It is useful when approaching the destination airport in ILS mode. The page contains five useful informations for a correct landing:



The "reception mode and needles" character shows if the radio is tuned or not and if needles are present in ILS mode. This character may be either:

• A dot, which signifies that the radio doesn't transmit any localization information, or that the radio is not correctly tuned,

- A vertical line, which signifies that the localizer has been captured and that the horizontal deviation information is available,
- A "+" symbol, which signifies that the localizer has been captured and that the horizontal deviation and vertical deviation (glideslope) information are available.

The ILS frequency is the frequency set on the NAV1 radio. The course angle is the one set for the ILS. The radio name and the distance to the radio are available when the localizer has been captured.

There are no data that can be changed on this page, so the *SoftButton* can't be used. You may use the "Function" button to display the previous or next page.

The "Lights" page

This page shows the current lights states. As for the COM and NAV pages, this page gives you the ability to switch on and off all the aircraft lights. Please notice that some lights are missing from this page (recognition lights, wing lights, etc) as they are not significant for the flight.



You may use this page as you do for the COM and NAV pages. The ">" symbol can be moved rolling the wheel of the *SoftButton*, and clicking the *SoftButton* switches the light on or off.

The "Weather" page

This page shows the current weather information: barometer value set in the aircraft panel, air temperature and wind information.



There are no data that can be changed on this page, so the *SoftButton* can't be used. You may use the "Function" button to display the previous or next page.

The "Checklists" page

This page has been added as I often forget to complete the checklist before take-off. And, as I use the excellent FSPassengers add-on (see http://www.fspassengers.com) to have passengers and crew aboard, I have penalties. My goal was to have on the MFD some notes I will be able to review at any time. A notepad. With check-boxes – it's better –

And here is the "Checklists" page, in which you may define as many messages as you want. Don't care about the number of messages, as only three of them are loaded in the MFD memory. All the other messages are in the X52 Pro Interface for FS9 memory blocks. Just beware of the size of each message to avoid an overflow. I don't know the size of the X52 Pro MFD memory, and I don't know how overflows are handled. I didn't check...

Well, how does it works?

When you select an aircraft in FS9, the X52 Pro Interface for FS9 gets the aircraft name (you see this name in the "Aircraft" page). The software then searches in the installation folder (where the "X52 Pro Interface for FS9.exe" file is located) for the files named: "Checklists.*.ini"

When a file in which the term between the dots correspond to the full name of the current aircraft, or to a part of the name of the current aircraft, the search stops and the file is selected.

If more than one file name correspond to the current aircraft name (fully or partially), the first one that meets the name is selected. The software doesn't perform complicated calculation to find the best one. It finds the first one.

If no file meets the current aircraft name, the software searches then for a file named "Checklists.ini". If found, the file will be used.

Some examples, assuming you're using the aircraft named "Airbus A320-211 (iFDG) ACME Airlines":

Files that correspond	Files that doesn't correspond
Checklists.Airbus.ini	Checklists.Boeing.ini
Checklists.A320.ini	Chechlists.A330.ini
Checklists.320.ini	Checklists.380.ini
Checklists.20-21.ini	Checklists.30-600.ini
Checklists.ACME.ini	Checklists.A320 211.ini
Checklists.iFDG.ini	Airbus A320.ini

Once the file fond, it is opened and all its contents are loaded into memory. In the computer memory, not in the MFD memory. Then, the first three lines are displayed in the MFD. Using the *SoftButton*, the software will only load the three lines to display, the other one will be kept in the computer memory.



To move the selector and scroll the display, roll the *SoftButton*. To check or uncheck a box, click the *SoftButton*. That's all...

The Checklists.*.ini file

The file is a profile file, you may open it with the Windows notepad or any text editor. This file only contains one section: [Checklists].

In this section, you may define keys. Don't care about the number of keys, the limit is the amount of available memory. The name of the key is not significant. Only the order of the keys is significant.

Each value (on the right of the equal sign for a key) must contain two informations separated by a comma: a 0 (zero) or a 1, and a message. The digit (0 or 1) means that the message must be displayed as a single text (0) or as a check-box (1). The comma is just a separator, and the message is the one to display in the MFD.

For instance, just look in the Checklists.A320.ini for the entries that correspond to the screenshot above:

A000=0,BATTERY STARTUP A010=1,Parking brake A020=1,Thrust idle

See how it's simple?

To use any character code, insert in your message a "\" followed by the ANSI code of the character as a two digits hexadecimal value. To insert a "\" character, insert in your message "\\".

Now, you just have to create your own checklists or performance charts or customized notepad...

The "Airports" page

This page gives access to a huge database of airports and runways. I did find this database on the internet, as a freeware and transformed it to be usable by X52 Pro Interface for FS9.



The first line is intended for editing the ICAO code of the airport for which information is required. Initially, this line looks like:

Airport: [?]???

The four "?" are the digits/letters of the ICAO code. The "[]" is the digit/letter selector.

Use the *SoftButton* to move to the left of to the right and select the digit/letter to change. Then, click on the *SoftButton*. The "[]" becomes: "> <". This shows that you're editing this digit/letter. Roll the *SoftButton* to select the needed digit/letter, then click on the *SoftButton* to validate the input.

Each time you validate, the X59 Pro Interface for FS9 searches for the ICAO code in the Airports.ini file located in the installation folder (the folder that contains the "X52 Pro Interface for FS9.exe" file). If found, the information for this airport is displayed on the MFD.

Once the airport information displayed, you may change the ICAO code again, or scroll up and down with the *SoftButton* between the information lines. You'll find there the airport name, coordinates, altitude, VOR frequency and identifier (if available) and the runways.

For each runway, you may click the *SoftButton* to display or hide the details of the runway: length, heading, altitude, ILS/VOR/DME type, frequency, course and identifier (if available).

The airports information contained in the Airports.ini file can be changed easily using the notepad. The file contents is self documented. If you correct wrong data or add missing data, please feel free to send me the modifications performed by e-mail, so I'll change the airports.ini file and publish it for everybody. Avoid sending me the whole ini file as if I received corrected files from many source, I don't know how I'll synchronize all of them. So please just send the modified sections...

The "Configuration" page

This page shows current configuration information and adds a boost mode to the software. It also displays the copyright text for your information.

This page is automatically added to the list of the displayed pages. You can't remove it.

The first line displays the current value for the timer tick (the value you set in the .INI file)

The second line displays the current value for the update rate, showing that the MFD is refreshed every Timer tick x Update rate milliseconds. In the picture below, you can see that the MFD is refreshed every 5 seconds.



You'll see that the "<" symbol appears on the right of the "Update rate" line. Click the *SoftButton* and check out the screen: the update rate is now set to 1. It's the boost mode: the MFD is now refreshed every "Timer tick" milliseconds (250 ms in the example above). This consumes much more CPU, but may be useful for critic maneuvers: landing the plane or acrobatic figures. Once unneeded anymore, you may disable the boost mode by clicking the *SoftButton* again and retrieve the previous value for the update rate.

The LEDs section

This section defines 11 keys, one for each LED available on the X52 Pro Flight Control System. These keys are described in the following table, and each of them can accept one of the values also defined below:

Key	Values	Description
Fire	0 or 1	Fire button on the stick
FireA	0 – 3 or A	Fire A button on the stick
FireB	0 – 3 or A	Fire B button on the stick
FireD	0 – 3 or A	Fire D button on the throttle pad
FireE	0 – 3 or A	Fire E button on the throttle pad
ToggleLeft	0 – 3 or A	Left toggle at the bottom of the stick
ToggleCenter	0 – 3 or A	Center toggle at the bottom of the stick
ToggleRight	0 – 3 or A	Right toggle at the bottom of the stick
POV2	0 – 3 or A	Point-Of-View at the top left of the stick
Clutch	0 – 3 or A	Fire i button on the throttle pad
Throttle	0 or 1	Power LEDs on the throttle pad

The "Fire" and "Throttle" keys only accept 0 or 1 values. 0 (zero) means that the LED must be off, 1 means that the LED must be on.

The other keys accept values from 0 to 3. 0 (zero) means that the LED must be off, 1 means that the LED must be on in green, 2 means that the LED must be on in red, 3 means that the LED must be on in amber (3 = 1+2 = green + red).

In addition, all these keys (except the Fire and Throttle keys) accept the "A" notation. The "A" notation must be written like this: "Autopilot?x:y", with x and y two values between 0 and 3. This notation means that if the autopilot is engaged, then the color of the button must be "x", and if the autopilot is not engaged, then the color of the button must be "x" and "y" must be replaced by a number.

For instance:

```
[LEDs]
FireA=Autopilot?2:1
FireB=Autopilot?3:1
FireD=1
FireE=1
```

With these informations, the FireD and FireE buttons will always be lighten in green. The FireA will be lighten in red and the FireB will be lighten in amber if the autopilot is engaged. The FireA and FireB buttons will be lighten in green if the autopilot is off, giving a visual indication of the state of the autopilot directly on the stick.

Additional features

The program also checks out for the stall warning and overspeed warning. In case of a stall, the big "Fire E" button at the top of the engine control stick blinks in orange/green. In case of an overspeed, the big "Fire E" button at the top of the engine control stick blinks in red/green.

Launching the program

Once the program installed and configured, plug the controller on the computer, then launch FS2004. The X52PI4FS9.dll module launches the X52 Pro Interface for FS9.exe program for you (you may also disable the module and launch the executable program by yourself).

The "X52 Pro Interface for FS9.exe" program checks out for the presence of the joystick (if not present it waits for 10 seconds before exiting), for FSConnect and loads the pages in the MFD. You're now ready to fly!

Uninstalling the program

To remove the X52 Pro Interface for FS9 from your computer, just open the control panel from the "Start" menu and select the "Add/Remove programs" icon. Click on the X52 Pro Interface for FS9 item and click "Remove".

Versions history

Version 1.2 (build 45)	Published Saturday, June 9, 2007 Addition: fuel quantity can now be displayed in pounds or kilograms Addition: other GUID for the X52 Pro controller Addition: LED color can change with the autopilot setting Correction: blinking FireE didn't revert to previous color. Fixed. Correction: the only section of the checklist files must be named [Checklists].
Version 1.1	Published Saturday, April 28, 2007 Additions: XPNDR, Checklists and Airports pages Addition: LEDs color feature Enhancement: reacting to the <i>SoftButton</i> scrolls and clicks.
Version 1.0	Published Saturday, April 7, 2007 Initial release.