

CHALK RIVER GRAPHICS

CrgSim Documentation

Installation and User's Guide

Chalk River Graphics

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FSX, Prepar3d, and FSX Steam:

This documentation was originally written when FSX was the main flight simulator these instruments were connected to. Since then the flight sim community has more choices. As you read the following pages and you see the term “FSX”, please mentally substitute all of the flight simulator choices. CrgSim connects to the simulator through FSUIPC so the actual simulator being used is relatively unimportant to CrgSim.

Quick Start 1 Instrument

Here is a quick way to try things out.

First: if you are already using FSUIPC then just skip this section. If you do not have FSUIPC installed then find and download a copy. The download site is currently:

<http://www.schiratti.com/dowson.html>

Follow the install instructions and when you have FSUIPC installed go on to the sections below.

After insuring that you have FSUIPC installed:

- Copy the CrgSim distribution to your FSX computer (best to select a directory other than one of the “Program Files” directories.
- Unzip the CrgSim distribution.
- Start FSX
- In the CrgSim directory **/SimInterface** start crgsim.exe
- In the CrgSim directory **/ComMgr** start crgcom.exe
- In the CrgSim directory **/PFDDLeft** start crgpfdl.exe
- Many FSX versions start with the Ultralite Trike as the default. Start flying this or any other aircraft that you like. Your Primary Flight Display Instrument started in the upper left of the screen should track the aircraft's movements.

If things are working as expected then time to add another instrument.

Quick Start 2 Instruments

- Follow the steps above and then in the CrgSim directory **/NavLeft** start crgnavl.exe.
- Pick an aircraft and fly it. The aircraft movements should track in both the Nav Display and the Primary Flight Display.
- The Nav Display range will probably not be what you like but we cover changing the range later on.

If you are flying the default FSX 737 The CrgSim PFD should look similar to that of FSX and the Nav Display will also look similar to the FSX NAV Display.

One Click Start - Multiple Instruments

The following information is best to read after you have selected the instruments that you want to run, decided which computer they are to run on, configured their size, and location, and now want to configure an easier start up.

Although CrgSim components can be run on multiple computers in many cases you will want to run multiple instruments on the same computer. This section describes how you can start all of the instruments that are running on the same computer as the communications manager with one click. On the communications manager screen click on the button labeled "Edit Start File". The following window will appear:

When starting the Communications Manager also start the following:

SIM Int <input checked="" type="checkbox"/>	Captain's PFD <input checked="" type="checkbox"/>
Clock <input checked="" type="checkbox"/>	Captain's Nav <input type="checkbox"/>
EICAS <input type="checkbox"/>	First Officer's PFD <input type="checkbox"/>
Sound Int <input checked="" type="checkbox"/>	First Officer's Nav <input type="checkbox"/>
Charts <input type="checkbox"/>	Crg Utilities <input type="checkbox"/>
GoFlight <input type="checkbox"/>	

OK Cancel

Check the boxes for the other instruments or components that you want to automatically start every time the communications manager starts. **This shortcut will only work with CrgSim components that you want to run on the same computer as the communications manager.**

If you want to start up each instrument individually or if they all run on other computers then there is no need to check any of the boxes.

One Click Shutdown

To shutdown the entire CrgSim system just click the “Exit” button on the communications manager window. All of the components will exit regardless on which computer they are running.

Quick Start 3 Instruments

Although CrgSim was written to support multiple computers and multiple screens, in many cases you may be able to run everything on the FSX computer provided it is powerful enough and you have an extra screen. This section describes how to get started with a two screen layout and has the additional benefit of not having to read the rest of the documentation until later. If you tried out the quick starts above with no worries then this step should work just fine. When successful you should have 3 instruments similar to the picture below:



First the system requirements:

All graphic instruments - require Vista, Win 7, or Win 8 with a graphics card that supports DirectX10. Your system may not have the DirectX10 drivers installed. If not, you can download the drivers from Microsoft. Download **directx_Jun2010_redist.exe** and install per directions.

Non-graphic programs (crgsim.exe and crgcom.exe) - should run on XP as well as the system described above.

To start: copy the CrgSim distribution to the FSX computer (preferably not one of the “Program Files” directory) and unzip the file. Now follow the steps below. If anything goes wrong then it's time to read the rest of the documentation. Also, as you start up each instrument you can press function key 2 and by following the screen directions adjust the instrument size and instrument location. For the 3 Pak display above each instrument was 533 pixels wide on a 1600 pixel wide screen.

- Move into the SimInterface directory and start crgsim.exe.
- Move to the CrgCom directory and start crgcom.exe.
- In the PfdLeft directory start crgpfdl.exe. Adjust instrument size and location by selecting the PFD instrument (click on it) and pressing the F2 key.
- In the NavLeft directory start crgnavl.exe. Adjust instrument size and location by pressing the F2 key.
- In the Eicas directory start crgeicas.exe. Adjust instrument size and location by pressing the F2 key.
- Start up FSX on one of the remaining screens.
- If running the GoFlight MCP Pro and/or EFIS now is a good time to start crgGF.exe in the GoFLight directory

The steps above should get you started. Additional features are explained in the rest of the documentation.

You may want to start the program (crgutil.exe) in the Utilities directory if you intend to use flight plans or need a keyboard interface to FSX and CrgSim variables.

Forward

CrgSim was written as a programming exercise and to provide an environment that we like to use when flight simming. The environment assumes that there will be no visible main aircraft panel nor will any of the other “sub windows” such as throttle quadrant or radios be visible on the main screen. The only graphics that FSX provides in our setup here in the lab is the main scenery window.

This assumption has several side effects.

First: some form of input had to be provided to make up for the desire not to use FSX sub windows. As an example: to change radio frequencies it is necessary to use hardware such as the Saitek Radio Module or to use the functionality provided by a separate CrgSim utility program called crgutil.exe. Similarly, autopilot variables can be changed with the GoFlight MCP Pro or by the crgutil.exe utility program.

Second: since no part of the cockpit or airplane is visible in our setup the type of aircraft selected to fly is not apparent. Flying a default airbus looks the same (since the cockpit is not being displayed) as flying the default 737 or some other default regional jet. The selected aircraft mainly provides flight dynamics and the absence or presence of some features. For example an aircraft may not have the Nav2 set of radios or may not have “Throttle Arm”.

All interaction, by design, is between CrgSim and FSX. So if a third party add-on aircraft operates with the same interaction with the simulator then it should be usable with CrgSim. However, since for our setup, the third party aircraft is not visible, the main benefit that we receive is perhaps a different and more realistic set of flight dynamics and improved sound files. Of course, for your configuration you may want to have a cockpit view as well as some of the sub windows visible most or all of the time. It's your flight simulator and you get to configure it anyway you want.

Note that some 3rd party add-on aircraft do not use many of the standard features of FSX and thus will not work properly with CrgSim. CrgSim relies on a standard set of variables provided through FSUIPC by FSX.

We use this software frequently and have discovered and eliminated many things that detract from the flight simming experience for us. Your input on what you like, or don't like, or believe to be wrong with CrgSim is most welcome.

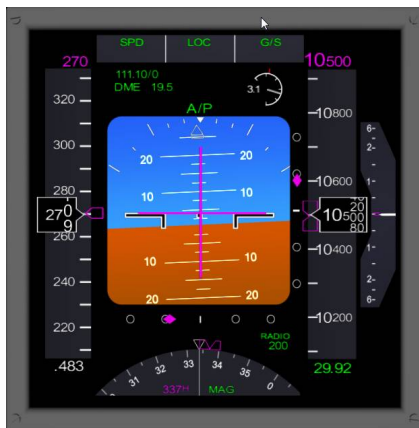
New feature suggestions are also solicited and welcome.

What is in the Zip File?

The zip file contains 5 main instruments.



- EICAS - Engine Indicating and Crew Alerting System display (crgeicas1.exe) located in directory **EICAS**.



- Captain's PFD - Primary Flight display (crgpfdl.exe) located in directory **PFDLeft**.
- First Officer's PFD - Primary Flight display (crgpfdr.exe) located in directory **PFDRight**.



- Captain's Nav Display - Navigational display (crgnavl.exe) located in directory **NavLeft**.
- First Officer's Nav Display - Navigational display (crgnavr.exe) located in directory **NavRight**.

Also included are:



A clock that displays local time or GMT and a time showing total sim time which is labeled ET.



A 737 style RMI stand by gauge



Two styles of PFD standby gauges. Each of the two regular primary flight displays can have a standby gauge. Associated with it.

The support programs:

- **Sound** - Sound module (crgsound.exe) located in directory Sound.
- **Communication Manager** - central CRG network switchboard (crgcom.exe) located in directory "ComMgr".
- **Utilities** - keyboard interface, status monitor, autopilot interface window, nav display interface window, flight plan loader, and flight plan editor (crgctrl.exe) located in directory "Utilities".
- **Simulator Interface** - the CRG interface to FSX, FSX SE , and Prepar3d via FSUIPC is located in the directory "SimInterface".

Basics

This software provides the ability to display a “real life” sized Primary Flight Display (PFD), Nav Display (ND), and EICAS Display for users of Flight Simulator X. Two PFDs, two Nav displays, one EICAS display, and one Chart display are provided. One set of PFD and Nav displays for the Captain, one set of PFD and Nav displays for the First Officer, and one shared EICAS and moving map displays. The instruments may be run on a different computer (or computers) than the one the simulator is executing on (and should be for best results if the main FSX computer is short on extra CPU cycles).

The NAV displays are independently configurable while flying and each display can have different ranges and modes of operation.

You can run as many or as few of the components as you need. If you are running a single place cockpit then you may want to display just the Captain’s PFD and the Captain’s Nav Display.

If you have an older computer that you would like to put to good use you may be able to run the CrgSim modules that do not require DirectX10. These include Utility, Chart, and CrgSound.

The Boeing 777 PFD and ND were used as models. Most of the testing was done with the FSX default 737 providing the flight dynamics and sound. **These instruments and associated programs are toys, do not use them in any way related to real life aviation.**

Since the Chart display, Com Mgr, and Controller do not use DirectX but legacy GDI they should run on a Windows XP machine and can be used as a standalone display with just Crgfsx.exe and Crgcom.exe to support them (see below). The sound module should run on Vista and above.

There are a lot of components to CrgSim, the recommended way to use the system is to take your time and bring up one display at a time.

The original goal of the system was to be able to devote one computer to FSX (the most powerful one) and the view forward. No instruments or other displays are run on the main FSX computer to be able to get the maximum quality view. The main display in the test setup is spread across three 24 inch monitors and provides an acceptable level of immersion for us. Subsequent testing has demonstrated that we can run FSX, the CrgSim FSX interface, the communications manager, CRG Flight Utility, and three instruments on the one sandy bridge computer.

The CRG Utilities program (crgutil.exe) provides a keyboard interface to flight and system variables. The variables are divided into autopilot, Nav display, radio frequencies, and general status. CRG Flight Utility reduces the need to open up a keyboard interface on the FSX computer. This program also includes a flight plan editor, a flight plan loader, and an aircraft profile loader.

Saitek radio hardware works just fine in our setup and allows the Control radio window to be removed.

The GoFlight EFIS and GoFlight MCP Pro interfaces provided by CrgSim allow you to connect these devices to most computers on your local network (see the GoFlight section for more information).

If you have autopilot (MCP/EFIS) hardware from one of the other vendors give it a try. This may eliminate the requirement for the Control autopilot window.

Note: For all configurations you will need to start the simulator interface crgfsx.exe (or crgr3d.exe) and the communications manager crgcom.exe.

If you find a problem with the software please let us know. The web site is at www.crgsim.com. It is “read only” since we ran out of time and patience trying to clear the spam from the site. We can be reached at sim30@crgsim.com

Thanks and enjoy.

Our Test Setup

The figure below is an image of our test set up. It consists of 3 larger screens to display the scenery, airports, and cities and a set of screens in the foreground that display the instruments.



The 3 screens in the background are driven by a sandy bridge processor computer with a moderately good display card. There are only two main programs that execute on this computer when testing:

- The FSX program with all the instruments and cockpit display removed. In our test setup this gives the best frame rate. We load an aircraft to provide the flight dynamics and then using the options menus remove all visible trace of the aircraft from the screen.
- The CRG interface program. This FSX interface program communicates with FSX via FSUIPC requesting the data it needs and then sends the data over the local net to the CRG communication manager on the same or another computer. No further processing is done on the FSX computer to preserve frame rates.

In the image above there are 3 foreground 15 inch screens with bezels placed in front of them to give the sense of two separate screens for each 15 inch display.

The outside screens running a PFD and Nav display each are driven by one win7 computer. The leftmost of these displays is a USB attached screen. This was a test to see how well one of these devices performs with the flight sim instruments. Our USB driven display works well, the instruments show up sharper and better looking than the non-usb screen but the update rate is not as smooth as the other non-usb display. Windows desktop is run on another screen attached to this computer and is not in the image above.

The middle screen with the moving chart display (washed out in the photo) and an EICAS are driven by a Win 7 laptop. The display connector is plugged into the VGA connection on the laptop. On the main laptop screen, the CrgSim sound module and keyboard interface/status screens (Control) are also running on the laptop.

On top of the instrument displays is a GoFlight MCP Pro and to the left of the mcp is a GoFlight EFIS. Both are connected with the CrgSim GoFlight Interface.

Not visible is a Saitek radio module which is used for compatibility testing.

Installation and Configuration

To get started unzip the distribution file on one of your computers so you can move the individual components to the computer where they will execute.

CRGSim does NOT modify the registry nor create directories except for those in the distribution zip file. Installation consists mainly of copying the various components to a directory of your choice on the computer that you plan to execute the component on. To uninstall, just delete the programs and directories that you created during installation.

The first thing to do is to determine where the various components will run. Since installation is relatively easy and since the network components automatically discover where the other components are located there is no complex configuration required. If you later determine you would like the CRG components to run on different computers, no problem, just move their directories to the new computer and start them up.

There is nothing to stop the execution of two copies of any program. For example two copies of the Captain's PFD (PFD Left) can be started but they will **not run properly** and will just confuse the communications manager.

Recommended File Locations

The simplest way to organize the files on each computer is to create a folder at the highest level called crgsim (<c:\CrgSim>) and then copy the appropriate CrgSim component directories to this directory on each computer.

NOTE: To uninstall just delete the crgsim folder on the computer. To update (when a new version comes out) rename the folder to another name of your choice, create a new “c\CrgSim” and install the new version. Assuming you have modified the standard configuration files and want to keep your custom configurations then copy the config files (.cfg) from the old folder(s) to the new folder(s).

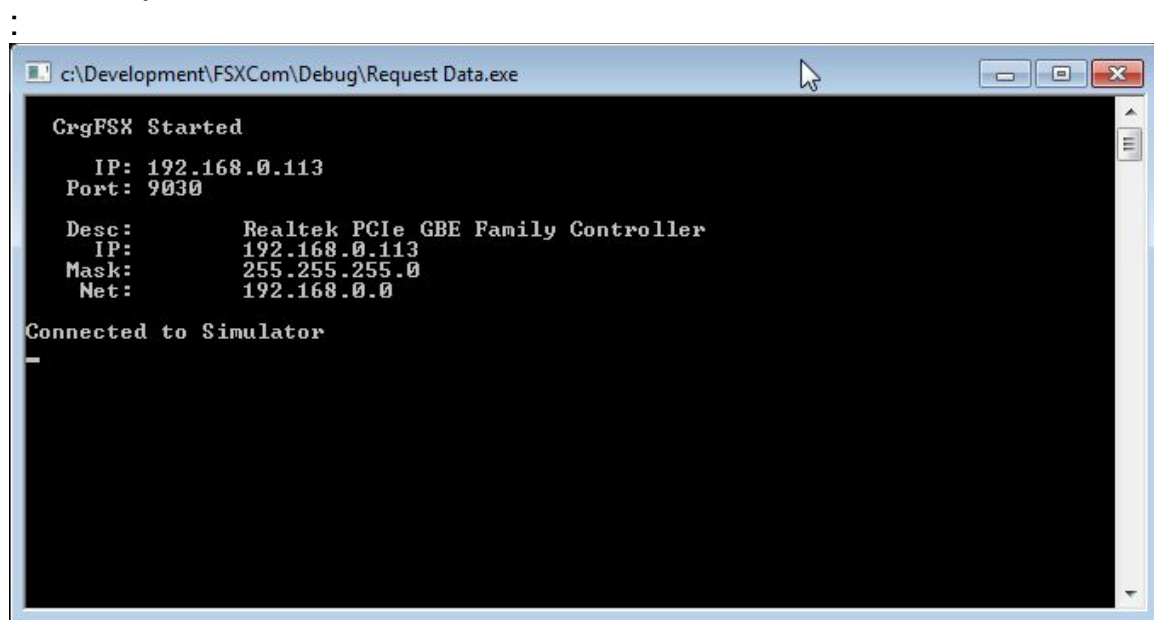
It is not recommended to install CrgSim programs in the “Program Files” or “Program Files (x86)” folder since some versions of Windows will not allow updates to files located in these folders (such as creating and updating program logs).

The best way to configure and run CrgSim is to tackle one component at a time. The following sections explain how to install and run each component. If you don’t wish to run one of the instruments just skip that section, it is not required that all of the instruments be running. In fact you could run just the sound module (no instruments) or just the Chart window if you choose. The minimum system would consist of the CrgSim FSX interface, the Communications manager and one of the instruments or sound module.

Our un-optimized FSX seems to take up 100 % of one of the cores in the 4 core sandy bridge machine and leave the other cores on average pretty much alone. We have done some testing with this machine: running crgfsx.exe (the interface to FSX), crgcom.exe (the communications manager), three of the instruments and FSX all on this machine to see if there are any frame rate hits or problems with the graphics. All of the crgsim components ran at the desired frame rate and FSX seemed unperturbed.

Simulator Interface Program

The program that communicates with the simulator is called **crgsim.exe** and is located in the SimInterface directory in the CrgSim distribution. Copy the SimInterface directory to the computer that you use for your simulator. Start the simulator and start crgsim.exe. After FSX completes starting up you should see the following window on the computer screen



The window above indicates that the simulator interface program and FSX are communicating with one another. A good start.

Communications Manager

The communication manager (crgcom.exe) is documented in “CrgSim ComMgr & Sound Module.pdf”.

Primary Flight Display (PFD)

The PFD (Captain's and First Officer's side) is documented in "CrgSim PFD & EICAS.pdf"

EICAS

The EICAS is documented in "CrgSim PFD & EICAS.pdf"

NAV Display – Captain's Side

The Nav Display is documented in "CrgSim NavDisplay.pdf".

Sound Module

The Sound Module is documented in "CrgSim ComMgr & Sound Module.pdf".

GoFlight Interface (Radios, EFIS and MCP Pro)

This interface is documented in "CrgSim OpenCockpits & GoFlight Interface".

CRG Locals

CrgLocals is a program that provides important variable exchange between CrgSim and FSX. To explain:

A great many variables are available from the simulator to drive the instruments. Many of these variables are two way, they are both provided from FSX and they may be sent to FSX. An example is the speed bug. The value is read from FSX and used to set the speed bug in the PFD instrument. The value can also be set in CrgSim and sent to FSX. There are hundreds of these variables and can keep the third party add-ons busy for a long time.

There are other variables that are not made available by FSX through the usual interface. To access these other variables it is necessary to install an additional CrgSim module that is a dll. It will automatically start every time you start your flight simulator. If you use default 737 EFIS and MCP and want your changes to the Nav display range and mode, and changes to the position of the ADF/VOR switches to be used by CrgSim you will need to install this program.

The altitude call outs and other in-flight announcements are started by the Locals program.

To install CrgLocals please follow these steps:

- Locate your FSX directory:
 - FSX - for many systems this will be: *"C:\Program Files (x86)\Microsoft Games\Microsoft Flight Simulator X"*
 - FSX Steam - *"C:\Program Files (x86)\Steam\steamapps\common\FSX"*
 - P3D V2.4 - *"C:\Program Files (x86)\Lockheed Martin\Prepar3D v2"*

The directory on your system may be different depending on how you installed the simulator software.

- Copy the directory CrgLocals to the directory above.
- Locate (search for) your FSX "dll.xml" file. Ours is located in the directory at: (yours will be different)
 - FSX - *"Users\Chuck\AppData\Roaming\Microsoft\FSX"*
 - P3D V2.4 - *"Users\chuck\AppData\Roaming\Lockheed Martin\Prepar3D v2"*
 - FSX Steam - *"C:\Program Files (x86)\Steam\steamapps\common\FSX"*
- Back up your existing dll.xml file
- Carefully add the following text after the last "</Launch.Addon>" and before the "</SimBase.document>"

```
<Launch.Addon>  
<Name>CrgLocals</Name>  
<Disabled>False</Disabled>  
<Path>CrgLocals/CrgLocals.dll</Path>  
</Launch.Addon>
```

Now the next time you start your flight simulator it will ask you if you want to run CrgLocals.dll. If you say yes FSX will ask you if you want to “designate this module as trusted?” If you answer yes then CrgLocals will be started automatically every time the flight simulator is started. We always say no to this last question for all of our addons. This gives us a chance to choose what will be running with each start of FSX. A minor (for us) inconvenience with each FSX startup but it does give us the opportunity to control which addon DLLs are running. Either way if probably just fine.

If you do start CrgLocals, the program will quietly sleep until CrgCom.exe is started.

CrgLocals now has another function. It plays the altitude call outs and sounds the horn when traffic gets to close on the NAV Displays. It is easy to substitute other announcements; either announcements from the internet or announcements you create. The set of most common altitude callouts should be available in several places on the net. If you prefer silence simply delete the announcement wave files you don't want from the CrgLocals directory.

When there is a status change in the simulator the sounds are muted for about 15 seconds. If the loading of scenery and/or aircraft take much longer you may hear a number of altitude call outs until everything settles down.

NOTE: CrgLocals creates a log file in the same directory as the flight simulator. Some OS versions will not allow this. If CrgLocals is installed and does not appear as connected on the Communication Manager screen it will be necessary to read the log file to assist in problem determination. If there is no log file in the flight sim directory called "CrgLocals.log" create a top level directory called \CrgSim and restart the simulator. If there is no CrgLocals.log file created in the \CrgSim directory then CrgLocals is probably not starting. In this case recheck the appropriate DLL.XLM file.

GoFlight Interface (Radios, EFIS and MCP Pro)

This interface is documented in "CrgSim OpenCockpits & GoFlight Interface".

How To

Change Variables

Depending on your configuration there are usually several ways to change flight sim variables:

- Use the usual flight simulator panel
- Use CrgSim defined keystrokes through the Utilities Window or a child window (Autopilot, Nav Display,...)
- Select an instrument and change variables with keystrokes (see below).
- Use installed hardware such as the GoFlight EFIS and GoFlight MCP PRO.
- Click on appropriate variables in a utilities sub window.

The “how to” sections below will not cover the usual flight simulator methods since these are documented elsewhere.

Note that the method or keystrokes used to change variables may (and probably will) change depending on the method you use. Selecting individual instruments allows the assigning of more meaningful keys compared with entering keystrokes in the Utilities window.

Change the Nav Display Range

- Utilities sub window - In the Utilities window, click on the “Nav” button, then in the Nav window click on the range buttons for either Captain or First Officer.
- Utilities Keystroke - select the utilities window or any of the sub windows and use the keystroke defined in KeyAssigns.pdf.
- GoFlight EFIS - if the software is running with the CrgSim drivers (see the GoFlight section) just use the EFIS range knob.
- Nav Display Window - click on the Nav display window (the upper left text (“GS”) will change to green indicating that the instrument has been selected. Then press the up arrow to increase range or the down arrow to decrease range.

Change the Nav Display Mode

- Utilities sub window - click on the “Nav” button, then click on the mode button (the “+” sign) for either Captain or First Officer.
- Utilities Keystroke - select the utilities window or any of the sub windows and use the keystroke defined in KeyAssigns.pdf.
- GoFlight EFIS - if the software is running with the CrgSim drivers (see the GoFlight section) just use the EFIS mode knob.
- Nav Display Window - click on the Nav display window (the upper left text (“GS”) will change to green indicating that the instrument has been selected. Then press the “m” key. Each keystroke will cycle to the next mode.

Select Object Type Viewed in the Nav Display

- Utilities sub window - In the Utilities window, select Nav, then click the appropriate check boxes (airports, stations, waypoints) for either captain or first officer.
- GoFlight EFIS - if the software is running with the CrgSim drivers (see the GoFlight section) just press the appropriate EFIS button to toggle airports, stations, or waypoints.
- Nav Display Window - click on the Nav display window (the upper left text (“GS”) will change to green indicating that the instrument has been selected. Then press the “a”, “s”, or “w” keys to toggle the display of the items.

Change Radio Frequencies

- In the Utilities window click on the “Radios” button. In the resulting radios window there are frequencies for two com radios, two nav radios, and two adf radios.
- Separate add-on hardware from Saitek can also be used to change frequencies.

Toggle “Flight Dir”, “Thrust Arm”, and “Autopilot”

- Utilities Keystroke - in the Utilities window or any Utilities sub window use the keystrokes defined in KeyAssign.pdf.
- Utilities sub window - In the Utilities window click on the “Auto Pilot” button. In the resulting autopilot window there are toggle boxes for each of these variables.

Toggle “VNAV” and “LNAV”

- In the utilities window click on the “Auto Pilot” button. In the resulting autopilot window there are toggle boxes for each of these variables.
- GoFlight EFIS - if the software is running with the CrgSim drivers (see the GoFlight section) just press the appropriate MCP button to toggle LNAV and VNAV.

Change the barometer setting

- PFD Instrument - select a PFD (the “GS” at the bottom of the speed tape will turn green to indicate that the instrument has been successfully selected. Then press “ctrl+b” to increase the barometer setting or press “b” to decrease the barometer setting.
- Utilities Keystroke - in the Utilities window or any Utilities sub window use “ctrl e” to increase the barometer setting or “e” to decrease the barometer setting.

Toggle the Nav display of airport names at 80 NM

Select the Nav instrument and press the letter “e”.

Change Autopilot Heading, Altitude, and Speed Values.

- In the “Utilities” window click on the “Auto Pilot” button. In the resulting autopilot window are buttons to change these variables as well as toggling “Speed Hold”, “Altitude Hold”, or “Heading Hold”.
- GoFlight EFIS - if the software is running with the CrgSim drivers (see the GoFlight section) just rotate the appropriate MCP Pro knob to change values.
- Nav Display Window - click on the Nav display window (the upper left text (“GS”) will change to green indicating that the instrument has been selected. To change auto heading use the right or left arrow keys. Use the up arrow to increase the altitude bug value or use the down arrow to decrease the altitude bug value. Then press the “a”, “s”, or “w” keys to toggle the display of the items. To increase the speed bug value press “ctrl+s”. TO decrease the speed bug value press “s”.
- PFD instrument - select (click on) a PFD. The “GS” just below the speed tape will turn green to indicate the instrument is selected. Then use the right arrow key or the left arrow key to change the auto heading.

Load a New Aircraft Profile

- In the Utilities window click on “Load Profile”, then select from the profiles presented.

Load a Flight Plan

- In the Utilities window click on “Load Flight Plan”, in the resulting window select and load the flight plan of your choice.

View status of current variables (Speed, Altitude, Heading)

- In the “Utilities” window click on the “Status” button. These variables (and others) are available (read only) in the resulting “Status” window.

Just select an airplane and fly

- If you have the CrgSim Communications Manager and the CrgSim FSX interface running as well as the instrument(s) of your choice then in FSX proceed as normal. Select an aircraft and starting location. If you selected one of the default turbine aircraft then use “Utilities->Load Profile” to load a profile matching your selected aircraft.

Loading and using a Flight Plan with the Autopilot

- Go to the section entitled “Flying with a Flight Plan.”

Preventing FSX sound from stopping when selecting another window on the FSX computer.

The short answer is you probably can't. If you run your CrgSim instruments on another computer then selecting one of the instruments should have no effect on FSX sound.

If you run the instruments on the FSX computer then selecting an instrument to modify a simulation variable will halt FSX sound until the FSX window is reselected.

If you want to run the instruments on the FSX computer and have an older computer you can try executing the communications manager on the older computer. This configuration may have a slight but unnoticeable effect on performance.

Configurations Tested in the Lab

Note: The PFD and NAV displays are based on Directx 10 and have been tested on Windows 7. They will not work on XP. They have not been tested on Vista but are expected to work if DirectX 10 drivers are installed. Both programs require a Directx 10 compatible graphics card.

In the lab the following configurations have been tested:

1. Both crgcom and all instruments executing on the same computer.

FSX Standard - XP machine #1
crgcom - Windows 7 64 bit machine #2
Instruments - Windows 7 64 bit machine #2
Keys - Windows 7 64 bit machine #2

2. Crgcom and instruments executing on different computers.

FSX Standard - XP machine #1
crgcom - Windows 7 64 bit machine #2
Instruments - Windows 7 64 bit machine #3
Keys - Windows 7 64 bit machine #3

3. Crgcom and instruments executing on different computers. Instrument computer is WiFi connected.

FSX Standard - XP machine #1
Crgcom - Windows 7 64 bit machine #4
Instruments - Windows 7 64 bit machine #5 (WiFi)
Keys - Windows 7 64 bit machine #5 (WiFi)

4. Simulator running on Windows 7 computer

FSX Accelerated - Windows 7 machine #6

crgcom - Windows XP machine #1

Instruments - Windows 7 64 bit machine #5 (WiFi)

Keys - Windows 7 64 bit machine #5 (WiFi)

Note: Our WiFi connection to machine #5 is relatively weak in the LAB. There is a facility for calculating UDP packet loss. For this configuration UDP loss was about 8%. This packet loss was not noticeable and did not detract from the proper operation of the Instruments.

Maps

CrgMaps is distributed as a part of the CrgSim zip file. There are a few maps of each scale included but if you want to run maps it will be a good idea to download the map packages you want from www.crgsim.com. There is probably no 777 prototype to compare to the map window to but it is run most of the time here.

It is good to see the other AI aircraft on the map.

Flying with a Flight Plan

After a flight plan has been loaded one or more points will be displayed on the Nav Display if they are within current range of the Nav Display. The first flight plan point will be activated. Each proceeding flight plan point will be activated by flying within approximately 2.5 miles of the point. Once activated the next active point is displayed in magenta and the line to the point is also displayed in magenta. Intersecting a flight plan path will not activate the flight plan. If you miss a point just fly within range of the next point on the flight plan to activate it. If you are using the autopilot and VNAV/LNAV is turned on you will be automatically flown to the next point at the specified altitude and air speed.

To automatically fly the flight plan, turn on Autopilot, VNAV, and LNAV on the Keys autopilot window. The Utilities program has a basic flight plan computer that will issue commands to the FSX program to fly the flight plan. The routine will also attempt to compensate for moderate crosswinds to remain on the track from one point to the next.

Once the last point on the flight plan has been reached VNAV and LNAV will turn off and the last heading and altitude will be maintained.

One of the flight plans included in the distribution called "Circle" will continually fly around a closed loop until the flight plan is manually terminated by selecting a "Load Flight Plan" window and pressing the clear button. TO use this flight plan as a test go to the Colorado Springs Airport.

Flight plans can be reset by reloading them or pressing the F3 key while a Utilities window has focus. They can be reloaded or changed while flying. When a flight plan is reloaded or changed VNAV and LNAV are turned off. If you want to use either or both VNAV or LNAV turn them on again on in the Keys autopilot window.

CrgSim follows the flight plan by sending altitude and heading commands to the autopilot in FSX.

Here is the sequence for loading and flying a flight plan from the Colorado Springs Airport. The flight plan specifies a path after taking off on runway 35L going North to circle around and set up for landing on 35 L again.

- With FSX select the Colorado Springs airport, runway 35L
- Select the default 737 in FSX
- With the Utilities window select profile “737 Default.crgpro.
- With the Utilities window select “Load Flight Plan” then load flight plan “KCOS 35R loop to KCOS 35R.fpf”. The flight plan path should be visible in your Nav Display window. The first flight plan point will be magenta.
- Turn on LNAV and VNAV either on the Utilities/Autopilot window or with the GoFlight MCP Pro. The new heading, speed, and altitude should be automatically entered into the MCP or Utilities/Autopilot window.
- Set your flaps to the take off position
- Turn on Auto Throttle Arm.
- Advance the throttles and take off.
- Above 400 feet AGL both the Heading Hold and Altitude Hold buttons will be illuminated (in the autopilot window or your MCP).
- For this flight around 1,000 feet AGL turn on the Autopilot and Speed Hold.

- If everything looks normal sit back and enjoy the trip.
- Before overflying the last waypoint start getting the aircraft set up for landing. (turn off VNAV and LNAV, set autopilot speed, set flaps, and eventually landing gear.).
- Begin your decent and land.
- Repeat as necessary

VNAV and LNAV must be turned on to fly a flight plan. These controls are not sent to the simulator so your single engine flight plan can fly with both of these functions enabled. Using the default 737 a typical takeoff could be:

Using the autopilot Keys window turn on flight director, auto throttle arm, VNAV and LNAV.

Set flaps for takeoff.

Increase throttle part way, when the engines have spooled up click on TO/GA.

Control the aircraft down the runway. At approximately 80 knots the annunciator will announce HOLD. Continue to control the aircraft.

On positive altitude gain raise the gear.

At approximately 400 feet AGL speed control will be activated and altitude hold and heading hold will be armed.

Click on autopilot when desired.

If a flight plan has been loaded and is activated you can set back and watch.

If a flight plan has been loaded but is not yet activated use the autopilot controls to fly toward the first waypoint.

Note that the TO/GA switch will not be activated on takeoff if the flaps are full up.

FSX Add On Compatibility

If a third party add-on exchanges all variables with FSX then CrgSim and the third party product should work together. For example if a third party aircraft sets a radio frequency by sending the frequency to FSX, then CrgSim is able to read that frequency from FSX so for this particular variable the two products can be considered compatible.

Assume though that a 777 add-on uses VNAV and LNAV and does not send these variables to FSX (where would they go anyway?) then CrgSim cannot read those variables. Some add-on aircraft keep a large number of variables private. These are not good candidates for inter-operating with CrgSim. In cases where an SDK is available from the manufacturer then the possibility of compatibility increases.

Interoperability may not be a big issue since the default aircraft (or add-on aircraft) provide just the flight model if you do not display the cockpit on the main FSX/Prepar3d screen. The 2d or 3d cockpit is not used in this case. This form of operation with a flight simulator may not be desired by many people though. CrgSim running without a cockpit display is just one of many options.

Auto Land

We use a short flight between Colorado Springs, Co. and Denver, Co. as a test flight to check out a release. It is a fun and short flight ending with auto land at Denver. Here's how to set it up:

In the Utilities screen click on the "Load Flight Plan" button. Select COS2DEN and click "Load".

- Select the Colorado Springs Airport (COS) and runway 35R.
- Turn on the flight director
- Set A/P speed to 300 knots
- Arm auto throttle
- Set A/P altitude to 10,000 feet and click the Alt Hold button
- Set A/P heading to 349 degrees and click the Heading Hold button
- Nav1 and Nav2 will automatically be set to a Denver ILS frequency when getting close to Denver.
- Turn on VNAV and LNAV (Keys autopilot screen)
- Increase throttle to about 60%. Then a few seconds later click on TOGA (Utilities->Autopilot screen) or press FK5 (one of the Utilities windows must have focus to recognize keystrokes)
- Take off and after verifying a positive rate of climb raise the gear.
- After the gear is up, set auto throttle to on, this should begin controlling your air speed to the value set above.
- Click the Cmd button to turn on the A/P. Raise the flaps.

The Denver signal should be acquired about 27 NM out after passing waypoint BOOBU or CORDE. When you see the glide slope diamond appear on the Primary Flight Display to the right of the artificial horizon and the altitude diamond appear to the right of the artificial horizon click on App (Utilities autopilot screen) and the plane should begin to automatically set up for landing. When APP (Approach) is activated both Altitude Hold and Heading Hold will be automatically turned off. Turn off LNAV and VNAV.

Be sure to wait until both the localizer diamond and the glide slope diamond appear before clicking APP.

You will have to control the speed, flaps, and gear. Set auto brake if desired if you have a cockpit display, otherwise apply brakes after touch down. At 1500 feet AGL LAND 3 should appear above the artificial horizon. On touch down turn auto throttle off, set throttle to zero, turn A/P off and start braking. You can turn off Speed Hold some distance out to begin controlling the throttle yourself. You can also disconnect the autopilot at 200 to 300 feet AGL to finish the flare yourself.

Any similarity between this flight and reality is purely coincidental.

Colorado Springs To Jackson Hole

Similar in setup to the Autoland at Denver, load the COS2KJAC flight plan and take off as you would above. This flight plan takes longer but is more of a challenge at the end. The last leg ends up in Jackson, Hold at 25,000 feet is you stay on the flight plan the whole time.

But 25,000 feet is not where you want to be on arrival! The challenge is to descend to a lower, but still safe, altitude and use the final flight plan position to line up on the Jackson Hole airport. When, not if, you land successfully take a look to the North West at the magnificent Grand Tetons. As a final effort you may find waypoints and/or NavAids in the Jackson Hole area that you can use to descend to and to line up with for the final approach into the Jackson Airport.

15 Inch LCD Panels

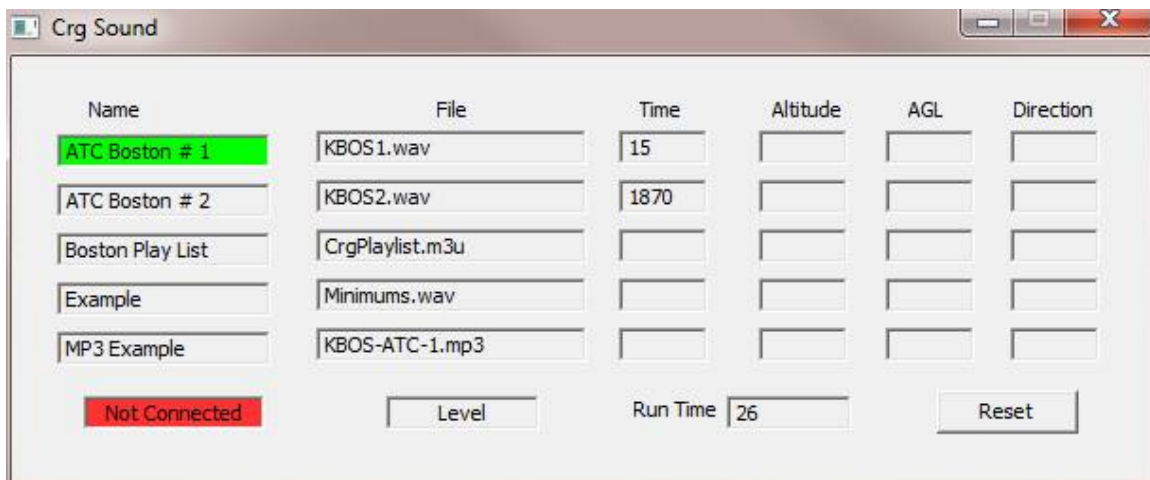
It seems that 15 inch LCD displays (and smaller) are getting hard to find and can be expensive. As an experiment we obtained some used 15 inch displays from a local computer repair store for very low prices. The displays were removed from their plastic cases, mounted behind panel cut outs, connected to the computer through VGA cables, and look great. For this size, high resolution displays are not a requirement.

Running a maps only system

If you want to use just the maps capability of CrgSim then you will need just one extra computer running XP or above. Install the Communications Manager and Maps on the same (non FSX) computer and install the FSX Interface on the FSX computer.

Running a sound only system

If you want to use just the sound capability of CrgSim then you will need just one extra computer running Vista (see note about XP and long sound files) or above. Install the Communications Manager and Sound on the same (non FSX) computer and install the FSX Interface on the FSX computer. Enjoy your aircraft with altitude call outs, even the Cessna 172 will now have altitude call outs.



The screenshot shows the 'Crg Sound' application window. It contains a table with columns: Name, File, Time, Altitude, AGL, and Direction. The first row, 'ATC Boston # 1', is highlighted in green. Below the table are controls for 'Not Connected' (red button), 'Level' (text box), 'Run Time' (text box with value 26), and a 'Reset' button.

Name	File	Time	Altitude	AGL	Direction
ATC Boston # 1	KBOS1.wav	15			
ATC Boston # 2	KBOS2.wav	1870			
Boston Play List	CrgPlaylist.m3u				
Example	Minimums.wav				
MP3 Example	KBOS-ATC-1.mp3				

Not Connected Level Run Time 26 Reset

Keyboard Alternative

The Genovation programmable keypad has also been tested with Crgsim. Their 6x4 keypad was programmed to generate the key sequences found in KeyAssign.pdf (included with this distribution) so many functions are available through the keypad such as gear up/down, AP on/off, speed, altitude, and heading functions, and flaps up/down. It is still a keypad but much less intrusive than a typical computer keyboard.

The keys are covered with a removable transparent cap so you can put your own labels on each key.



In Case of Trouble

1. Communications Manager does not list any Register Requests from the simulator:

- Make sure that `crgfsx.exe` or `crgr3d.exe` are running on the simulator computer.
- Examine the ComMgr log and verify that the ComMgr startup IP address and port number in `crgcom.log` are correct.
 - Use the windows command line “`ipconfig`” to list the available adapter addresses.
 - Ensure that the port number is not in use by another program.
- Examine the `CrgFsx.log` file in the Flight Simulator X computer.
 - The start time should reflect the local computer time that the simulator was last started.
 - Make sure the listed IP address and host name are correct.

2. Communications Manager does not list any Register Requests from the instruments and other modules.

- Make sure that **crgcom.exe** (the Communications Manager) is running and that no anti virus packages are blocking messages. The CrgSim components communicate with UDP. No messages are sent to anywhere outside of your local net except once on startup from the Comm Manager when optionally checking for a newer version.
- Examine the instrument logs (CrgPfdR.log is the log file for the right PFD) located in the directory that the PFD executable is located. The instrument log should have a line that says: "HostName:" , and another that says "Selected IP" and another line that says "Monitor Port is:".
 - Ensure that the Host Name and IP are correct. Verify by using the command "ipconfig /all" in a command line window.
 - Look for a line that says "GetUdpMsg() - Connected to ComMgr". If this line is missing the instrument and the ComMgr are not communicating.
 - After the "Connected" message above, the IP and Port of the ComMgr will be listed. Check that these values match the "Selected IP" address and "Port Number" listed in the ComMgr Log File.
- Note that CrgSim components will look for a non-routable network address (172.x.x.x, 10.x.x.x, 192.x.x.x) to use in case there is a VPN address (for example: from Hamachi) in the IP list.

3. The numbers on the GoFlight MCP are flashing or otherwise acting strange.

- The most likely problem is that both the GoFlight drivers and the CrgSim drivers are running at the same time. Only one set of drivers should be running.

4. The flaps animation (moving gray area) on the EICAS does not match the magenta bar identifying the flaps target position.

- The default aircraft profile is for the default FSX 737. Other profiles (example: default 777) are available in the Utilities directory. The profile must match the aircraft being flown for the flaps animation to work correctly.
- Using one of the existing aircraft profiles you can create a custom profile with flap position count and flap positions matching the aircraft you are flying.

Display Considerations

In our lab there are 5 windows: PFD right, PFD left, EICAS, ND right, and ND left. Each display is a separate program and creates a separate movable re-sizable window. The displays used here in the lab are small 15 inch monitors. Each monitor has a black background and displays one PFD and one NAV. The windows do not have a border or title bar and therefore are not moveable or re-sizable by the usual way of grabbing the border or title bar and dragging. The position and size of the displays are specified by a configuration file so you do not need to move things around every time your system is started. Once set the PFDs and NDs will start up in the same location specified by the configuration files.

Each instrument includes a bezel by default. If you place your instrument behind a physical cutout in your forward cockpit panel you can specify removal of the bezel to provide a little more flexibility for you.

The PFDs and NDs are designed to be a relatively square display on the screen. For displays where the pixel aspect ratio is not square the width and height in the config file can be adjusted to produce a square display. The display will look presentable down to about 550 pixels square but looks best close to 700 pixels square and above.

Network Considerations

All CrgSim components have to be run on computers located on the same local network as the simulator. The components locate one another via UDP messages so any intervening routers or switches on the local net must pass these messages. Local net (192..., 172...) UDP broadcast messages are not routable so they will not be passed on to the internet. After connecting, inter CrgSim component communication is via UDP.

On startup each CrgSim component inspects the computer's internet adapter to determine available IP addresses and net masks. It then selects one to use. This is successful most of the time. Since a computer may have multiple IPs and multiple Ethernet adapters it is possible that the component will chose one that has no connectivity to either the simulator local net or to the other components. You can override the IP and/or net mask with either command line parameters or by configuration files depending on the component. Most local nets will probably have an address beginning with 192.168.x.x.

To find out information about your computer's network interface open a (MS Windows) command line window and type "ipconfig /all".

Units Conversion

At this time altitude units are in feet. A PFS "meters box" is on the list of changes to make. There is an option to change the PFD barometric pressure from inches of Hg to millibars.

Performance

There are two computers in the lab that have been used to check performance. One computer has an AMD Phenom II X4 840T processor and the other has an AMD Phenom II X4 820 processor. Neither of the processors is considered high performance but they are decent performers. Both computers run Windows 7 and DirectX 10.

The target fps for all instruments at this time has been set to 20. Just below the fps there is another line that begins with "PAUSE". This line displays the sleep time necessary to maintain a 20 fps update rate. Note that the display image is updated at a much faster rate, the rate that fps is referring to here is the screen content update rate.

On our slower machine (820) with all of the instruments running (two PFDs and two NDs), the Communications Manager, and Utilities fps is 20 and Pause is 32. Looking at the process monitor the load on the CPU is minimal. However, right after startup there is something causing the fps rate to drop to 7 or 8 and the pause value to go to zero. The instruments perform choppy and the look and feel is not satisfactory. CPU core 3 is loaded to around 25% while the other cores hover around zero. By terminating some of the background programs the performance rate eventually jumps to desired values. This has not been associated with any particular program and remains a mystery.

Lab performance is almost always improved significantly by turning off the "Themes" service with the task manager. Start the task manager, select services tab, right click on Themes and select "Stop Service". On reboot the Themes service will restart normally.

On the faster machine (840) things have always run with the system configured normally.

No Com, No Sim, No Int

There are 3 programs that must be running for the instruments to receive flight data for display. Chart, Nav Display, and PFD will display an error message if one or more of these programs is not found in the local network.

- NO COM - the instrument cannot locate the Communications Manager.
- NO INT - the interface to FSX cannot be located on the local network.
- NO SIM - The communications manager and the interface to FSX is running but the interface cannot locate FSX.

Note that if the interface is not running the communications manager will still maintain contact with all of the components however response to commands will be slow.

Contact

You can contact us at sim30@crgsim.com. We are especially interested in your comments, any problems you might have with the programs, and things that you like (or don't like) about them.

After spending a large amount of time removing non-flight sim posts (drugs, counterfeit boots, ... for sale) we reluctantly had to convert the web site to read only.