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Fly Elise-ng
Immersive LCD PRO
Step-By-Step Guide

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1 Introduction

This is a step-by-step guide for setting-up a seamless and geometrically correct multi-monitor setup.

This setup produces perfect geometrically correct images in the LCD monitor screen that are dependent on the monitors positions and orientation.

As a result of the LCD design and calibration, the Immersive LCD PRO exports the virtual camera frustum settings (position, orientation and field of view), which can be used directly in the game or other 3D engine to produce the images for each LCD display.

Immersive LCD PRO also exports the warping configuration to be loaded as external .lcdcalib file for geometrical correction of the LCD display image to get a correct undistorted views.

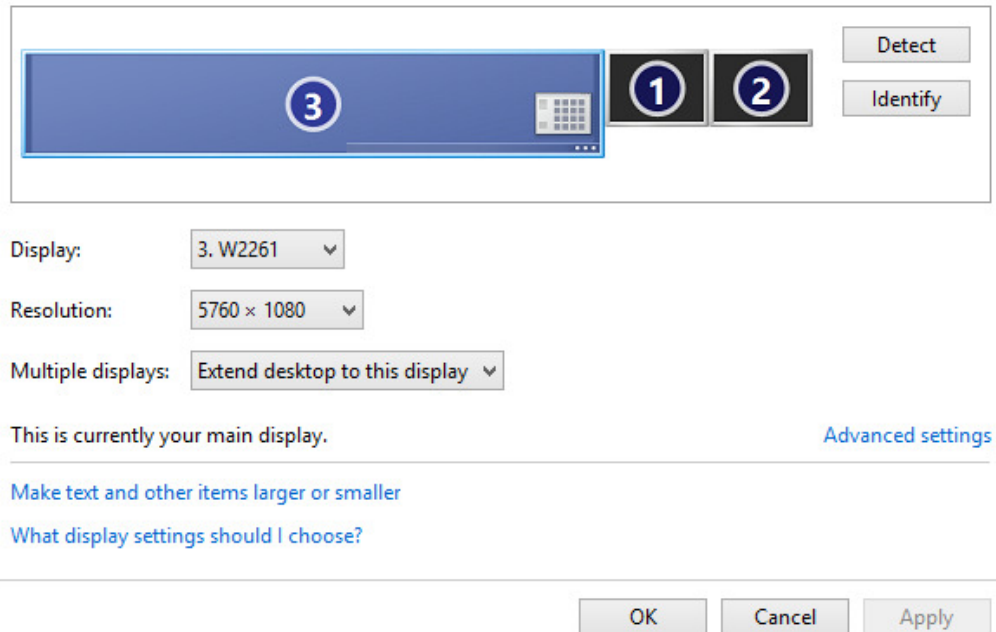
For the purpose of this step-by-step guide we will use one of the most common multiple LCD display setups using 3 LCD panels connected to a single PC. The outer LCD displays are rotated by about 30 degrees inwards to create an omni-directional view.

As an example for this step by step guide we will use 3 identical Samsung SyncMaster S22C200B, 21.5 inch monitors. The native resolution of the monitor is 1920x1080. The width of the image panel is 47.7 cm and the height is 26.8 cm. The black bezel width (around the LCD panel) is 1.5 cm.



The simplest configuration is to have one wide display (3x1) created either by using **Matrox TripleHead2Go** or **ATI Display Group** or **NVidia SLI Surround**. The graphical program (ex FSX, Prepar3D, X-Plane, etc.) will run on this display.

Change the appearance of your displays

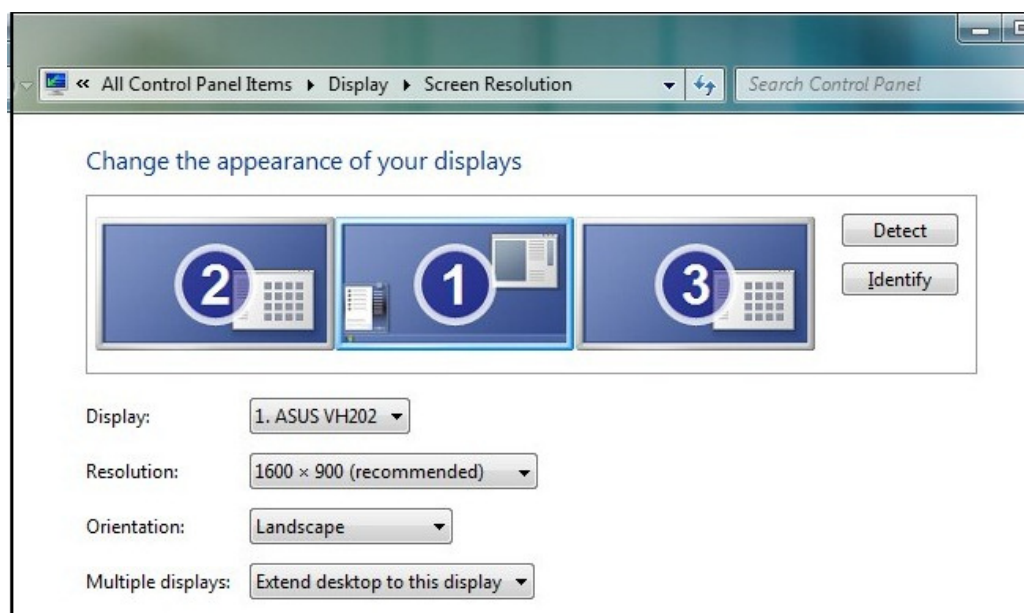


The screenshot shows the Windows Display Settings window for a single wide display configuration. At the top, there is a visual representation of the display setup with three numbered icons (1, 2, 3) representing the display segments. Below this, the settings are as follows:

- Display: 3. W2261
- Resolution: 5760 × 1080
- Multiple displays: Extend desktop to this display

Buttons for "Detect" and "Identify" are visible on the right. At the bottom, there are "OK", "Cancel", and "Apply" buttons.

Note: When using the latest version of P3D v3.3+ with ViewGroups.xml, make sure that the displays are not grouped as one single display. P3D v3.3+ with ViewGroups.xml require ungrouped displays in extended desktop mode.

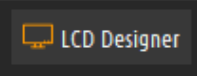



The screenshot shows the Windows Display Settings window for a multi-monitor configuration. At the top, there is a breadcrumb trail: "All Control Panel Items > Display > Screen Resolution". Below this, there is a search bar labeled "Search Control Panel". The visual representation shows three numbered icons (1, 2, 3) representing the display segments. Below this, the settings are as follows:

- Display: 1. ASUS VH202
- Resolution: 1600 × 900 (recommended)
- Orientation: Landscape
- Multiple displays: Extend desktop to this display

Buttons for "Detect" and "Identify" are visible on the right.

2 Start and configure LCD Setup

Start LCD Designer software  and click the LCD setup wizard button  (from the toolbar of the New menu). This will open the LCD panel wizard for simple definition of the LCD monitors, their setup and orientations. Select the resolution of a single LCD monitor (in our case 1920x1080). Also select LCD Configuration 3x1 mode to match the grouped desktop mode the LCD monitors are connected to.



In the LCD Panel Size enter the exact horizontal and vertical dimensions of the LCD image area (excluding the bezels) and enter the estimated distance of the eyepoint (head) from the center LCD monitor.


In the LCD Bezel Size enter the size of the bezel on each size of the monitor. In our case this is 1.5 cm.

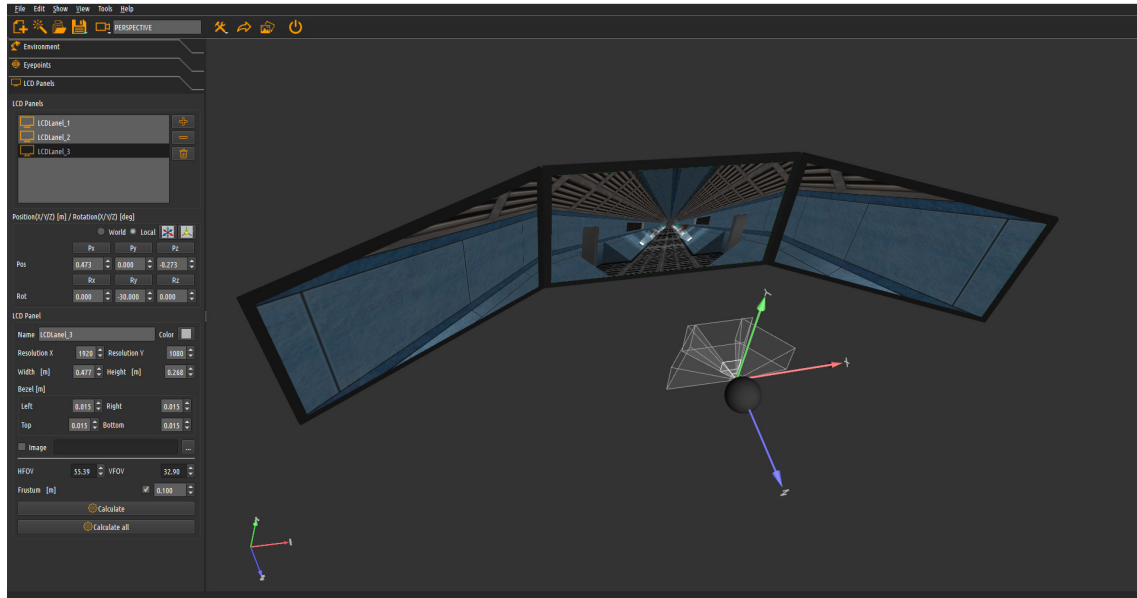
Now select LCDPanel_1 (the left LCD panel) and enter the rotation of the LCD panel with respect to the center LCD Panel. In our case it is 30 degrees.

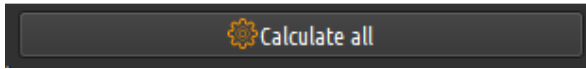
Select LCDPanel_3 (the right LCD panel) and enter the rotation of the LCD panel with respect to the center LCD Panel. In our case the setup is symmetrical and the rotation is 30 degrees.



The windows will show a top – down preview of the LCD Panel orientations and the eyepoint.

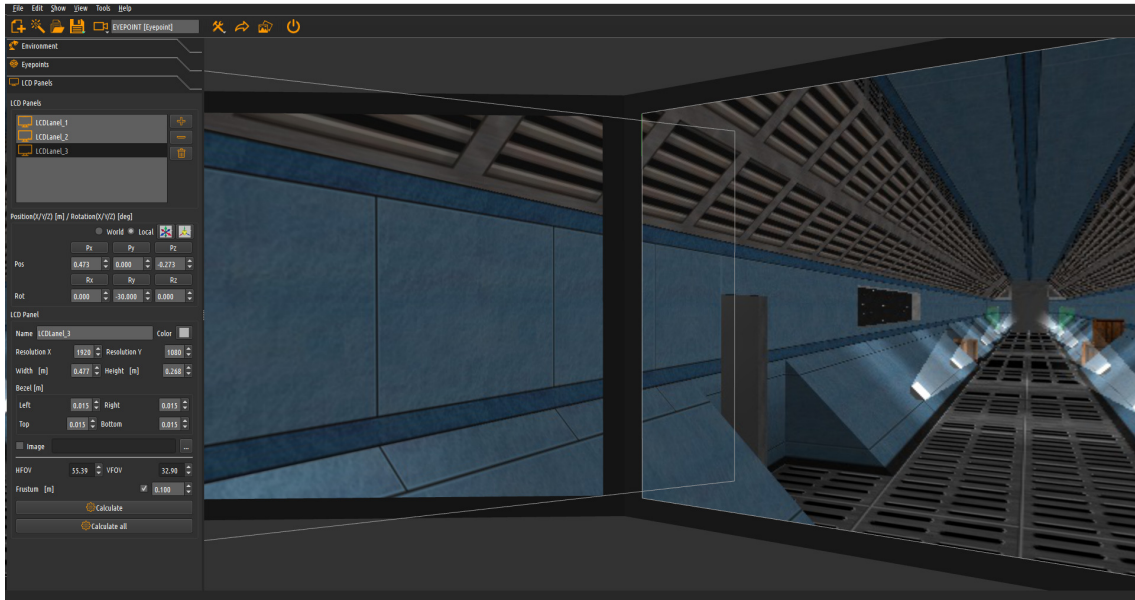
Press the “Create” button . This will create a 3D representation of the LCD monitors.



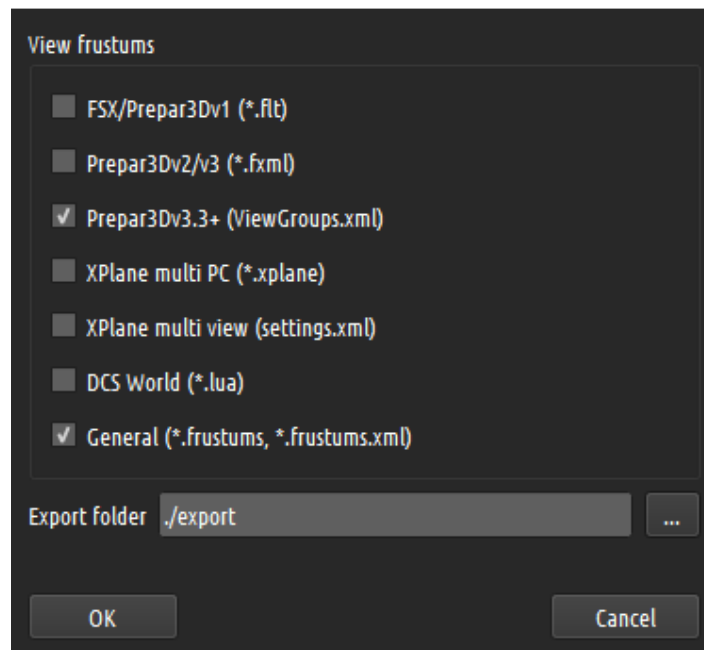
Press the “Calculate all” button  to calculate the frustums and geometrical correction needed for perfect undistorted image.

Note: Each time the position, orientation or the properties of the LCD Panel is changed, the Calculate all needs to be pressed to calculate the data.

The result of the calculation and the result when this is applied in the game engine can be previewed by selecting View/Eyepoint. This will position the viewer in the designed eyepoint and using the mouse button the head can be rotated to view the LCD panels.



Press the Export button  and the export dialog will open.



Select a folder where the exported data will be saved, and select the desired types of export. Press OK to export the files.

Note: When asymmetric frustums are used, some of the export options are not available because the corresponding software does not support

asymmetric frustums. Disable the asymmetric frustum option for each LCD panel to enable those export options.

The export function will produce multiple exported files for different simulation software and game engines, as well as data file to be loaded in Immersive Display PRO.

For the purpose of this step by step guide, we will use the Prepar3D flight simulator, although the exported data also contains info for FSX, X-Plane, DCS and xml file for an arbitrary game or gaming engine that supports multiple view (Example: Unity, etc...).

When showing the content of a 3D application (Games, Simulators, CAD, etc...) that have support for multiple cameras, each LCD panel can show image from a single virtual camera. The total image will not be constrained by a single camera field of view but it will match the LCD panel field of view.

3 Prepar3D (up to v3.2) and FSX configuration

Prepar3D and FSX provide a mechanism to create one or more windows inside the simulator and define the camera parameters (position, rotation and zoom) per window.

Exported p3d_group.fxml and p3d_groupVirtuCockpit.fxml files are for our setup 3x1 monitor Prepar3D/FSX setup. Those file contain the windows and camera configuration files that can be copied in the Prepar3D/FSX .xml flight file loaded by the simulator.

When using the p3d_group.fxml file the virtual cockpit is not shown. Only the outside view will be shown.

When using the p3d_groupVirtuCockpit.fxml file, the virtual cockpit view will be shown.

Note: When using the p3d_group.fxml file make sure that the model.cfg file of the aircraft that is used does not contain the interior. Comment out the interior part by putting // before the interior section in the file.

Ex: model.cfg

[models]

normal=Piper_J3Cub

//interior=Piper_J3Cub_Interior

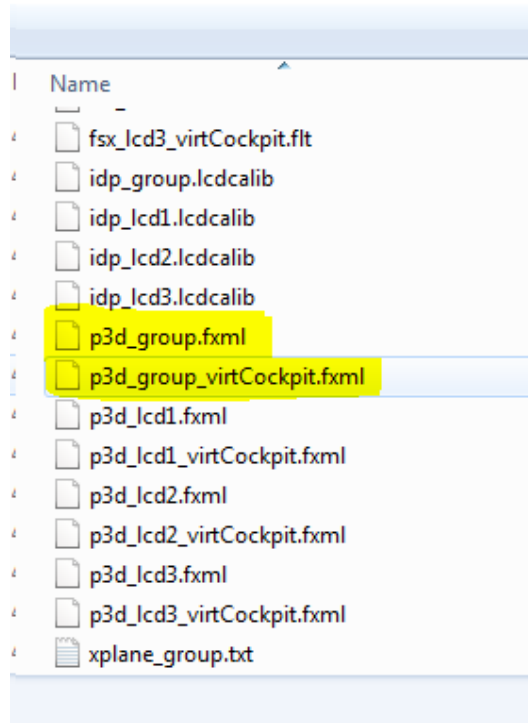
When using the p3d_groupVirtuCockpit.fxml file make sure that the model.cfg file of the aircraft that is used contains the interior. Remove any comment before the interior part in the interior section of the file.

Ex: model.cfg

[models]

normal=Piper_J3Cub

interior=Piper_J3Cub_Interior



Open the FSX/Prepar3D .fxml file and delete all xml sections for Window and Camera (Ex:

```
<Section Name="Window.x">
.....
...
<Section Name="Camera.x.x">
.....
...

```

Copy the content of the exported p3d_group.fxml file inside the .fxml file at the same place as the original `Window.x` and `Camera.x.x` sections.

Note: Make sure that the `WideViewAspect` option is enabled in P3D Graphics settings screen.

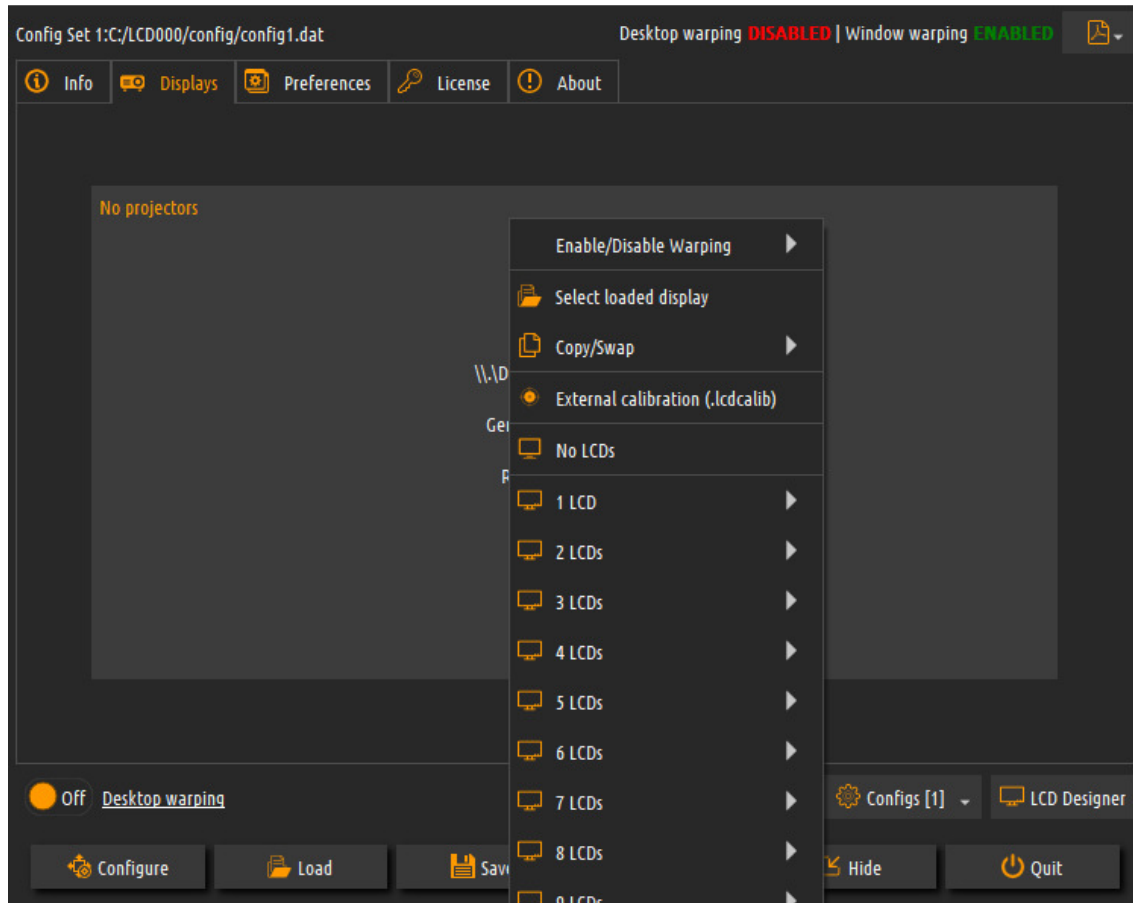
If using FSX make sure that the file `%APPDATA%\Microsoft\FSX\fsx.cfg` contains the following entry:

WideViewAspect=True

```
<Section Name="Window.1">
  <Property Name="Order" Value="1" />
  <Property Name="Active" Value="False" />
  <Property Name="Undocked" Value="False" />
  <Property Name="Maximized" Value="False" />
  <Property Name="Locked" Value="False" />
  <Property Name="ScreenUniCoords" Value="0, 0, 2731, 6144" />
  <Property Name="CurrentCamera" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
</Section>
<Section Name="Camera.1.1">
  <Property Name="Guid" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
  <Property Name="Title" Value="Cockpit" />
  <Property Name="PanelOnlyView" Value="False" />
  <Property Name="Zoom" Value="0.987427" />
  <Property Name="Translation" Value="0.000000, 0.000000, -0.000000" />
  <Property Name="Rotation" Value="-0.000000, -51.068817, 0.000000" />
  <Property Name="SensorMode" Value="0" />
  <Property Name="PostProcess.0" Value="HDRPostProcess" />
  <Property Name="PostProcess.1" Value="FXAAResolve" />
</Section>
<Section Name="Window.2">
  <Property Name="Order" Value="2" />
  <Property Name="Active" Value="False" />
  <Property Name="Undocked" Value="False" />
  <Property Name="Maximized" Value="False" />
  <Property Name="Locked" Value="False" />
  <Property Name="ScreenUniCoords" Value="2731, 0, 2731, 6144" />
  <Property Name="CurrentCamera" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
</Section>
<Section Name="Camera.2.1">
  <Property Name="Guid" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
  <Property Name="Title" Value="Cockpit" />
  <Property Name="PanelOnlyView" Value="False" />
  <Property Name="Zoom" Value="0.854872" />
  <Property Name="Translation" Value="0.000000, 0.000000, -0.000000" />
  <Property Name="Rotation" Value="-0.000000, 0.000000, 0.000000" />
  <Property Name="SensorMode" Value="0" />
  <Property Name="PostProcess.0" Value="HDRPostProcess" />
  <Property Name="PostProcess.1" Value="FXAAResolve" />
</Section>
<Section Name="Window.3">
  <Property Name="Order" Value="3" />
  <Property Name="Active" Value="False" />
  <Property Name="Undocked" Value="False" />
  <Property Name="Maximized" Value="False" />
  <Property Name="Locked" Value="False" />
  <Property Name="ScreenUniCoords" Value="5461, 0, 2731, 6144" />
  <Property Name="CurrentCamera" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
</Section>
<Section Name="Camera.3.1">
  <Property Name="Guid" Value="{B1386D92-4782-4682-A137-738E25D1BAB5}" />
```

4 Immersive LCD PRO setup

Start Immersive LCD PRO click on the 3x1 display and select “External Calibration” menu. Navigate to the folder containing the export and select the `idp_group.lcdcalib` file. Press the “Save” button to save the changes.

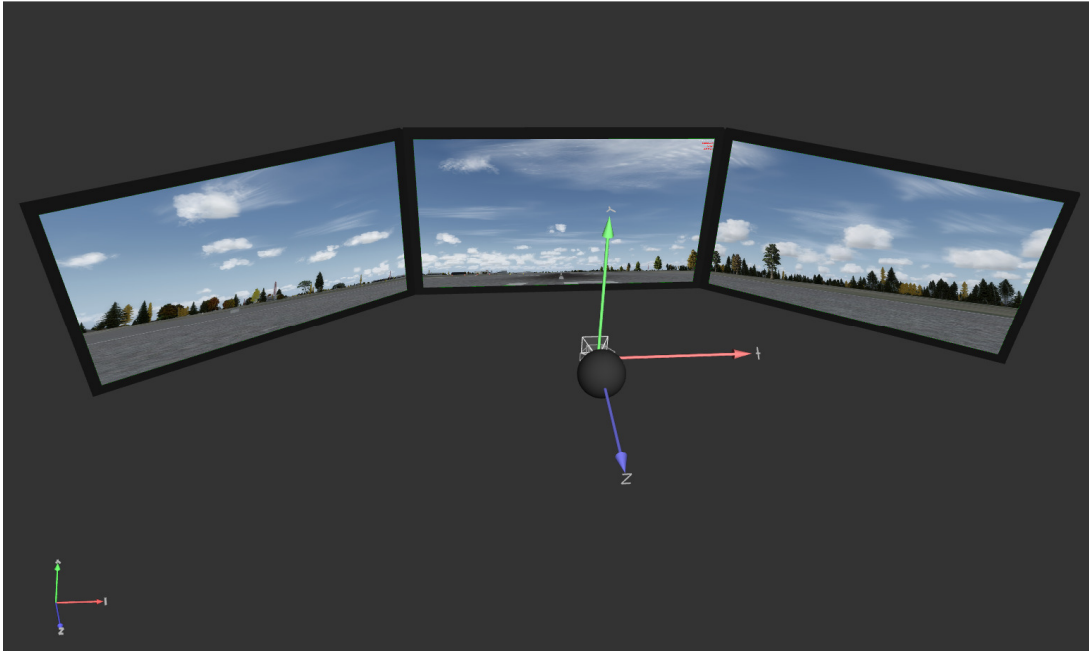


Start P3D in full screen mode. P3D will open 3 internal docked views and each view will show part of the scene.

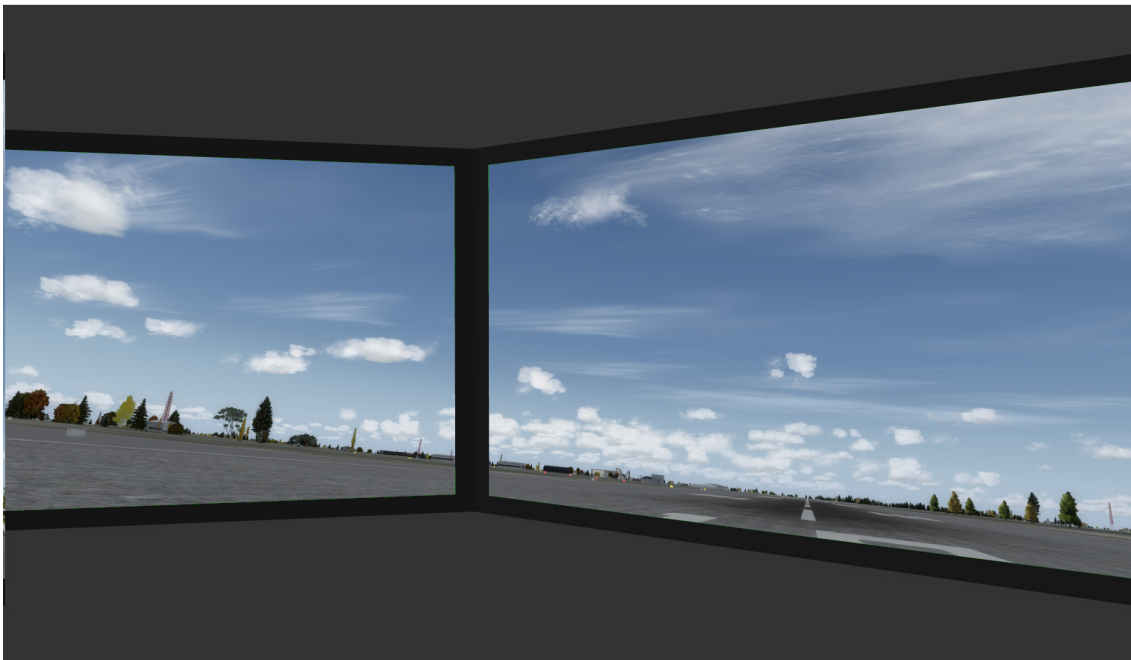
The image on the LCD displays will show perfectly aligned view.

Note: When the views are warped, part of the menus might become invisible because of the geometrical correction. In order to show the menus, toggle the widow warping using the Immersive Display PRO Toggle Window Warp key combination. The default key for Toggle Window Warp is F4. If this key interferes with the P3D key combinations, redefine this key in Immersive Display PRO Preferences/Input screen.

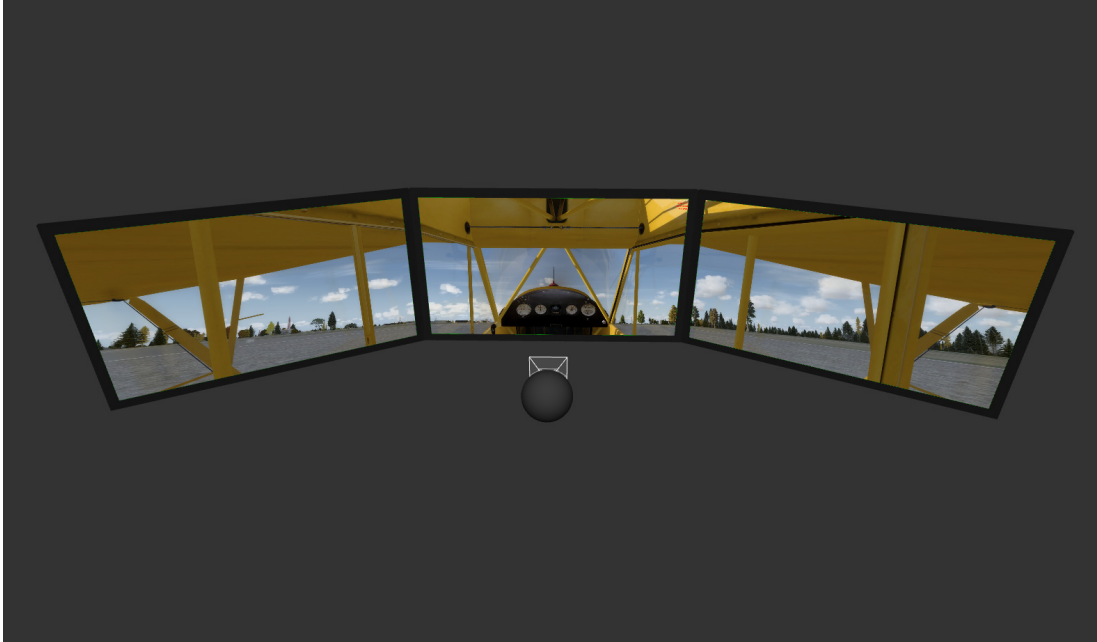
This is the result when using p3d_group.fxmll file on P3D v3.2 or lower or when using ViewGroups.xml on P3D v3.3 or higher:



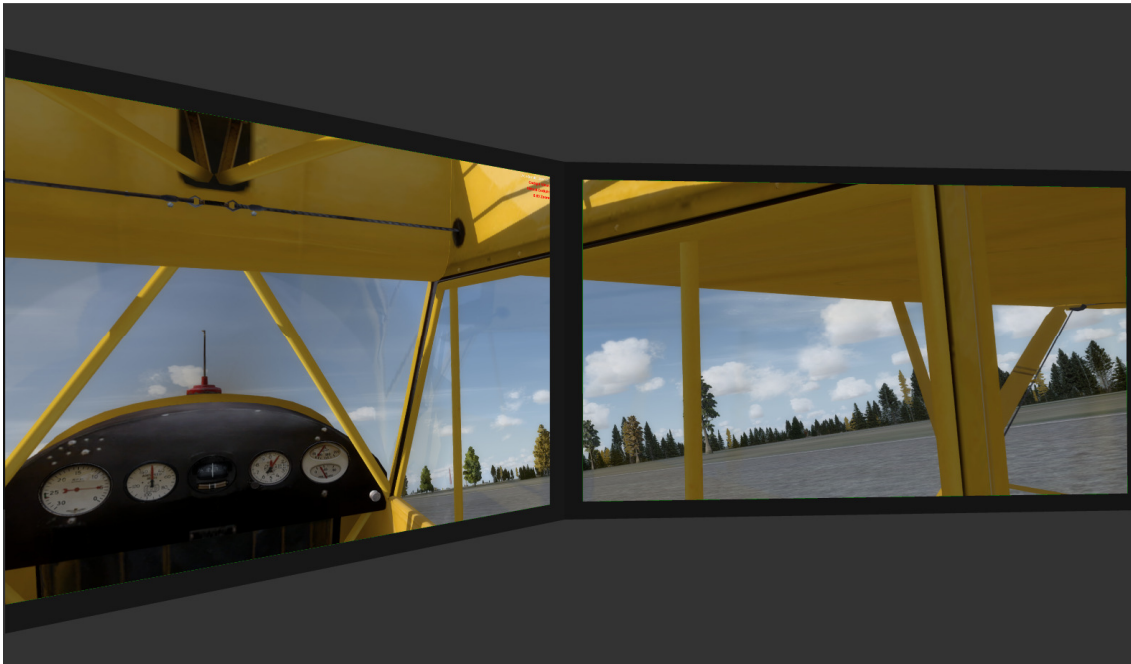
And when viewed from the eyepoint (head turned to the left):



This is the result when using `p3d_groupVirtuCockpit.fxml` on P3D v3.2 or lower or when using `ViewGroups.xml` on P3D v3.3 or higher:

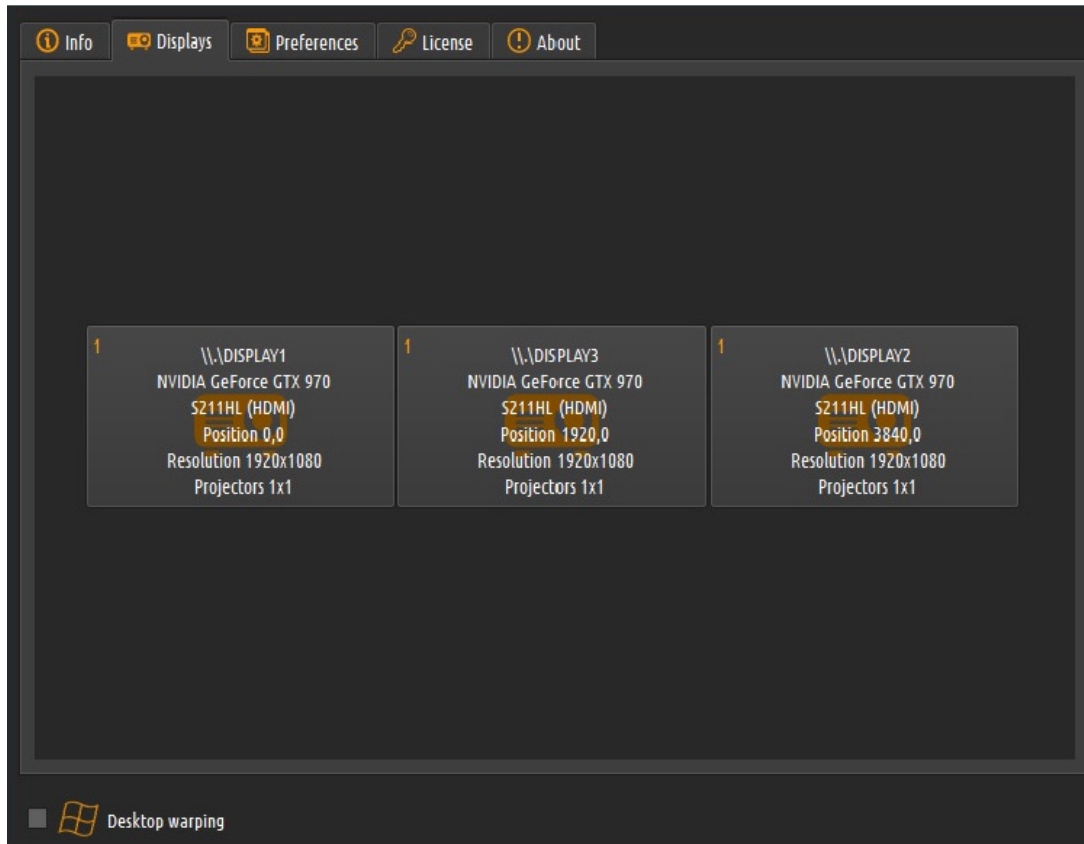


And when viewed from the eyepoint (head turned to the right):



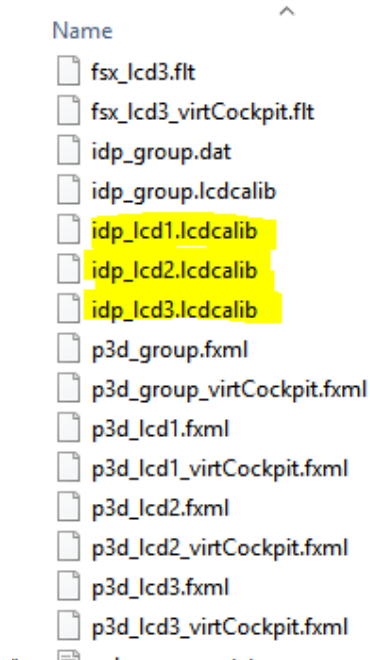
5 Configuration of ungrouped displays

In case the multiple LCD panels are connected on ungrouped displays, then the software also exports a `.lcdcalib` file per display.



In that case the individual `.lcdcalib` files need to be loaded in the corresponding display in Immersive Display PRO.

Note: Do not use the `idp_group.lcdcalib` file.



Note: The following steps are only needed for P3D v3.2 or lower when View Groups.xml file is not used. When running P3D v3.3 or higher use the ViewGroups.xml file and skip the following steps.

In order to configure P3D with the 3 views do the following steps:

- After modifying the .fxml file and copying the content of the p3d_group_XXX.fxml file into the flight file, open P3D (do not start Immersive display PRO yet), load your modified .fxml flight, switch to windowed mode and undock the views.

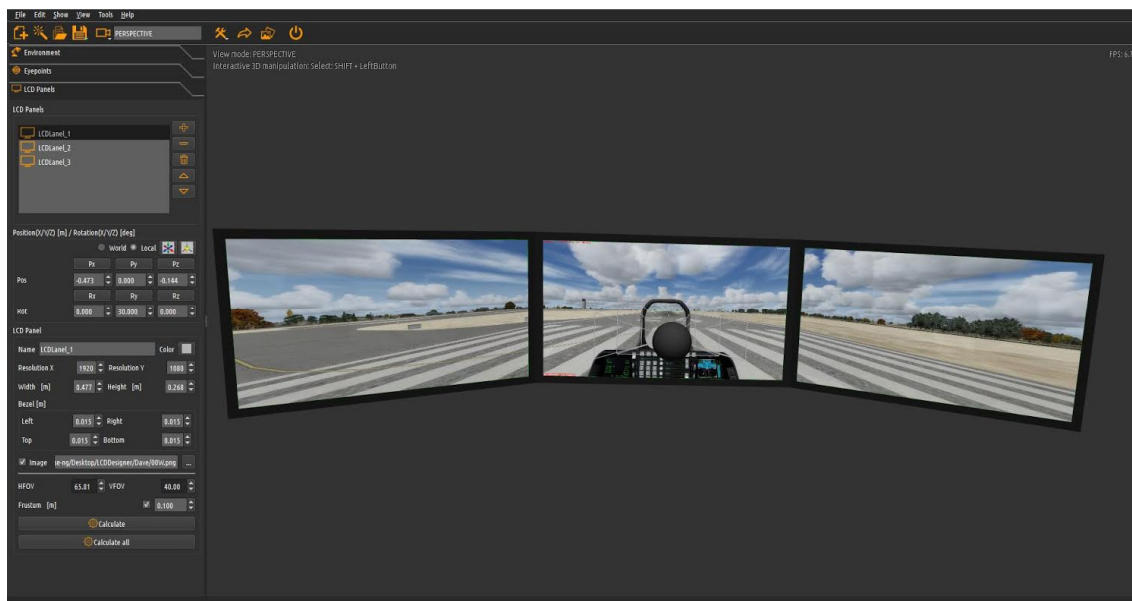
- Move the undocked view windows to the corresponding LCD, maximize them and go to full screen mode (ALT+ENTER). Now from P3D save the flight again (preferably to another name).

- Now start Immersive Display PRO and in each of the displays presented in Immersive Display PRO load the corresponding .lcdcalib from the LCD Panel exported folder.

Note: do not load the `idp_group.lcdcalib` file but the other `.lcdcalib` files (one per display). Make sure that you load the matched file (as it was designed in Immersive LCD PRO).

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- Start P3D, and load your saved file. If the 3 views are not positioned and maximized on the corresponding LCD panels, go to windowed mode (ALT+ENTER), undock them move them to the corresponding LCD panel, maximize them there and to go back to Full screen mode.
 - If the menu cannot be seen, toggle the warping with F4 (default window warping key in Immersive Display PRO), use the menu to load the flight and after loaded toggle the warping again for perfect geometrical corrected visuals.



6 Prepar3D v3.3 and higher *with ViewGroups.xml*

Prepar3D v3.3 introduced a feature named View Groups. On multi display systems, View Groups can be created to easily configure views across multiple displays using the View Group Management window.

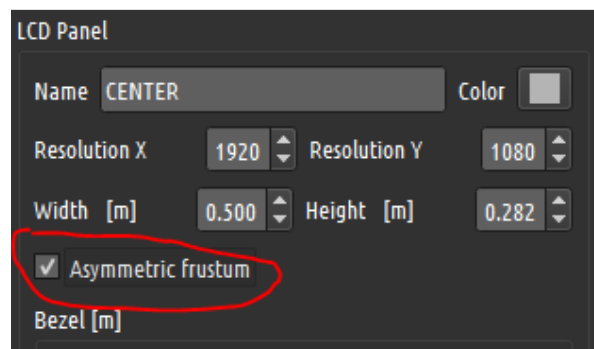
http://www.prepar3d.com/SDKv3/LearningCenter/getting_started/view_system/display_configuration.html

It is very important that the displays are **NOT** grouped using NVidia 2D surround, ATI Eyefinity or Matrox Dual or Triple Head to Go. Use the information from the previous “Configuration of ungrouped displays” section to load the individual .lcdcalib files in the corresponding displays in Immersive Display PRO.

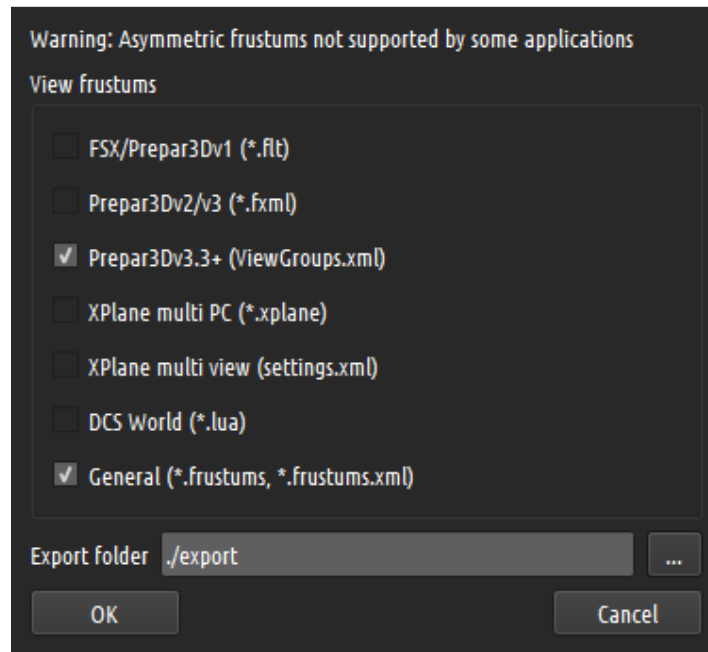
There is no more need for modifying the flight files (fsxml files) for creating correct geometry for multi-projection or multi-LCD panel systems.

One important feature of View Groups is the possibility for asymmetric frustums (camera). This allows Immersive Calibration PRO and Immersive LCD PRO to calculate the best frustum fit and ensure minimum pixel loss and minimum image stretching.

In Immersive LCD PRO make sure that the option “Asymmetric frustum” is enabled for each LCD Panel.

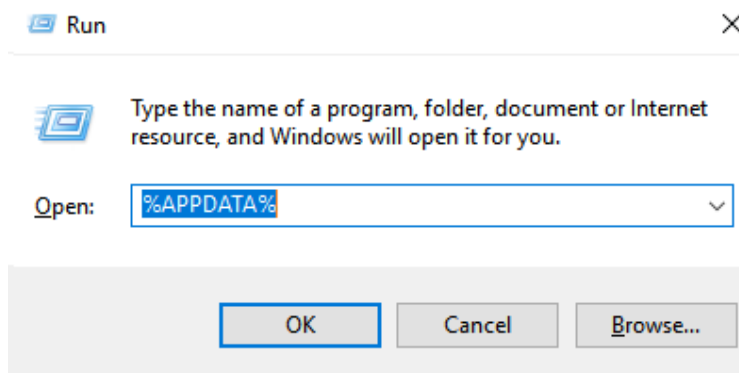


After enabling the Asymmetric frustum for all LCD Panels, press Calculate all to calculate the optimal frustums and export the P3D v3.3+ data.



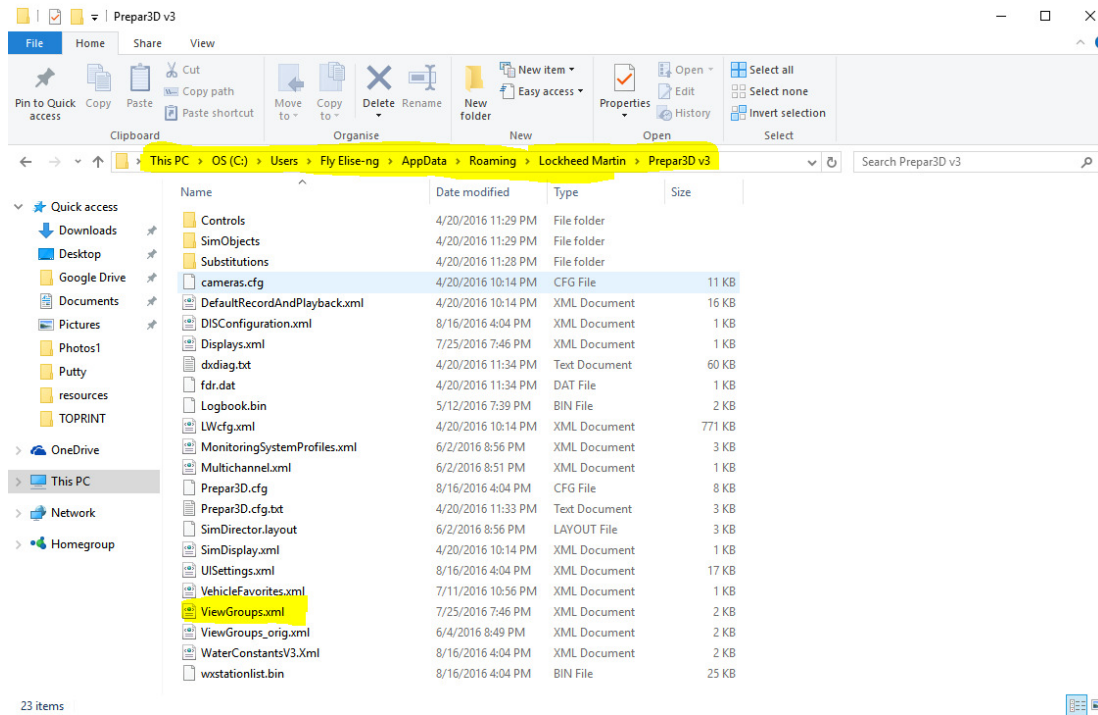
This will export a file ViewGroups.xml that can be copied into the P3D configuration folder.

Open the folder “%APPDATA%\Lockheed Martin\Prepar3D v3”. The easiest way is to press WIN + R keys, type %APPDATA% and press enter. This will open the “%APPDATA%\” folder. Open the underlying Lockheed Martin\Prepar3D v3 folder.

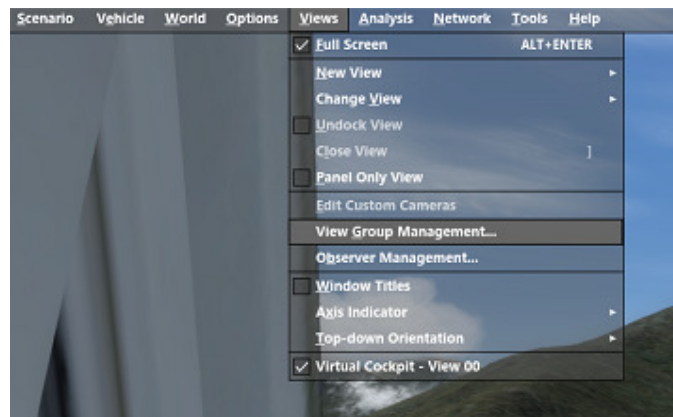


Rename/backup the existing ViewGroups.xml file and copy the exported ViewGroups.xml file in this location.

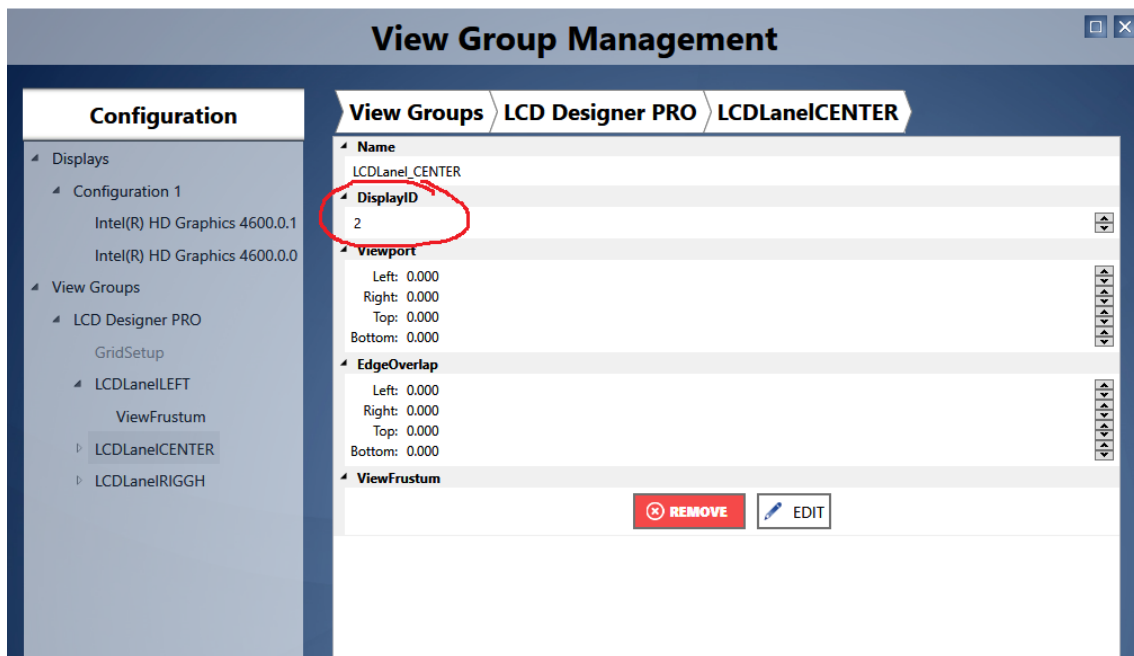
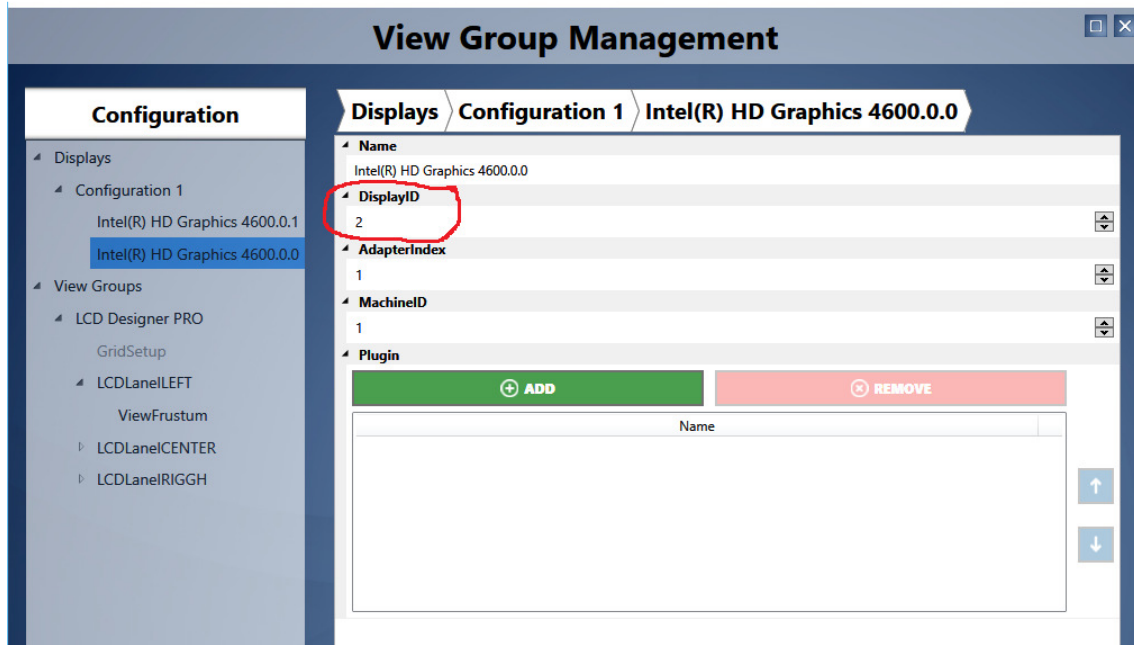
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When P3D is restarted it will load the exported ViewGroups.xml. Open the P3D View menus and select View Group Management.



Just make sure that the enumerated displays and graphics cards on your system match the DisplayID exported in the ViewGroups.xml file. If they do not match, assign them the correct DisplayID using the View Group Management window.



Now you can start any flight in cockpit mode or virtual cockpit mode.

Use the right button and click on the current view (not the View Menu) and select View Groups, then click on Immersive LCD PRO. This will create and position the view as identified in the ViewGroups.xml file previously loaded.



Note: When using the ViewGroups.xml file, there is no need to update the flight fxml files. The ViewGroups.xml file will make sure that the view are positioned on the correct LCD Panels.