

Cockpits Version 3D-1

By jogad February 2013

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I. Presentation

This is a plug-in for both Vincent's Lua plug-ins and Lua Edu Tools.

You can even use this plug-in with Lua Edu Tools when the Lua Edu Tools toolbox is hidden.

It has two main functions:

Cockpit management

It allows using several cockpits. You can change cockpit without leaving Celestia.

The plugin manages:

Simple cockpits made of a simple texture

Cockpits with multiple views including the possibility to have external views.

3D cockpits which are true 3D models of cockpits or full models of spacecraft.

Navigation and maneuvering help

Maneuvering in space becomes much easier.

The speed management is assisted by the program.

The usual keys of the pilot mode (a, q, z, x, *, s) are redefined to behave more friendly.

A new operating tool allows you to move left, right, up and down as well as forward and backward.

Note that the plug-in is provided alone, without cockpits.

They must be downloaded and installed separately

II. Installation

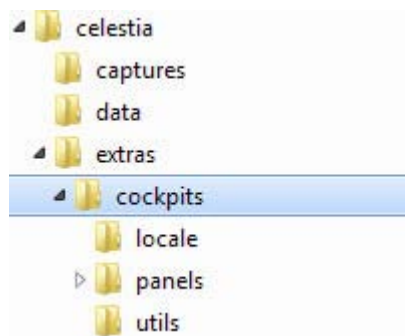
1) Before install the Cockpits plug-in, be sure that one of these programs is correctly installed:

- [Lua Edu Tools version 1.2 beta 9](#) (Version 1.2 beta 8 works as well)
- [lua plug-ins for Celestia 1.6](#)

Note: These two programs are mutually incompatibles. You must choose one or the other.

2) Unzip the file “**cockpitsV3D-x.zip**” in the **celestia/extras** directory.

You must get a structure that looks like this:



The plug-in is now on place but not yet active.

Activation in Lua edu tools

Search for the file 'config.lua' in the "lua_edu_tools" directory. Seek for the following text and add a line like that:

```
toolset
{
  "timeBox",
  "lightBox",
  "magnitudeBox",
  "galaxyLightBox",
  "renderBox",
  "obsModeBox",
  "solarSystemBox",
  "fovBox",
  "addsBox",
  "cockpitsBox",      --    <== line to add
  "infoBox",
  "coordinatesBox",
  "distanceBox",
  "magnificationBox",
  "HRBox",
  "KeplerParamBox",
  --"virtualPadBox",
  "compassBox",
}
```

Beware of the capitalized "B" in cockpitsBox

Important: the line must be added where you want but before "CompassBox" which must be the last item.

If you have yet and item "cockpitBox" (without «s») just add the missing "s" to be able to use the new plug-in

Activation in Lua plug-ins

Search for the file 'config.lua' in the lua_plugins directory. Seek for the following text and add a line like that:

```
plugins =
{
  "compassBox",
  "coordinateBox",
  "KeplerParamBox",
  "pictureBox",
  "HRBox",
  "cockpitsBox",      --    <== line to add
}
```

Beware of the capitalized "B" and the "s" in cockpitsBox

III. Utilization

The navigation help

The keyboard

The usual key for the navigation [a, z, s, q, x, *] works as usual or are slightly improved.

The **[x]** key whose function was to set the moving direction in the same direction as the view was quite useless. It is now fully useful.

The **[w]** key is a replacement key for [a].

It is designed to work with the cockpits. Unlike the [a] key which sets the speed in the same direction as the view, it set the direction in the direction of the spaceship.

Another big difference is that it adjusts the speed depending of the distance of the reference object.

The **[q]** key is slightly modified. If you are stopped, it initializes a movement backward with a suitable speed.

The **[s]** key stops the movement. If you press it again, it resumes the movement.

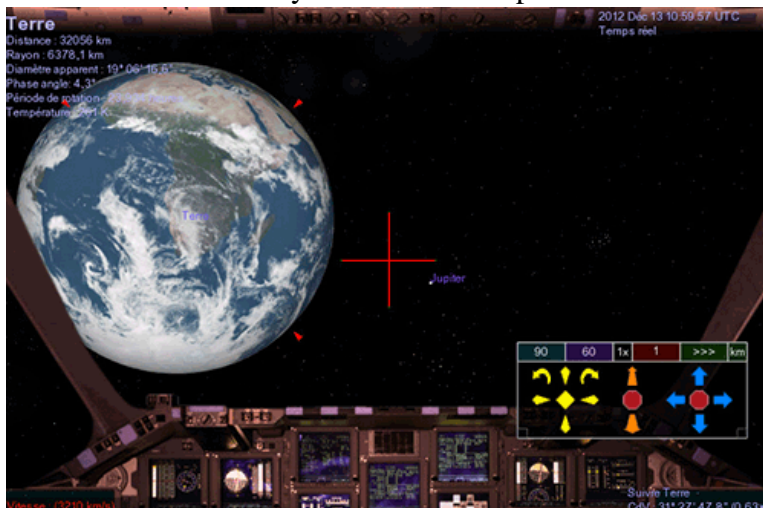
And at last, if you use the **[*]** key when you are stopped, the [a] or [w] key move always in the right direction.

Note: All these functions are available even if there is not a cockpit displayed. This means that the speed control by the cockpits plug-in is always active.

The manoeuvre tool

The manoeuvre tool works fine with the multipanel cockpit tool but is independent of it.

You can use it even if you have no cockpit.



Activation / deactivation

The tool is activated with the **[shift-X]** key.

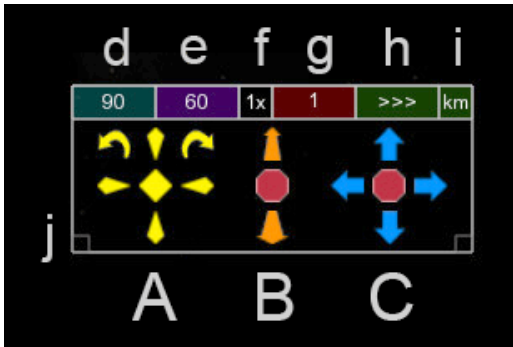
If you press repetitively this key you get

- a little red cross visor at the center of the screen

- the visor and the manoeuvre tool
- the manoeuvre tool alone
- neither visor nor manoeuvre tool

You can move this tool anywhere you want on the screen.

Manoeuvre tool commands



A, B, C : 3 groups of arrows to perform rotations and displacements.

A : rotation arrows. These arrows initiate a rotation (yaw, pitch and roll).

By default, the rotation is 90°. If you click several times on the same arrow, the rotations are added. e. g. if you click quickly 4 times, the rotation is 360° without a stop between the rotations.

The center button stops the rotation. clicking again on this button resumes the required rotation.

B, C) displacements. You can move in only one direction at a time. i.e. you can't move simultaneously forward and to the right or upward and to the left.

By cons, you can perform a rotation and a displacement at the same time.

The red buttons stop the displacement (whatever the direction).

Pressing again one of these red buttons resumes the displacement.

By default the required distance is not limited.

The movement is relative to the current view, not necessarily the direction of the spaceship.

As for the [w] key, the initial speed is determined by the distance of the reference object.

Orange arrows: forward and backward movements

Blue arrows: left, right, up and down movements.

Red points: stop/resume movement

d, e) rotation control

d) angle of rotation (in degrees)

You can enter the angle you want here. Click on this field and type the value of the angle. Do not use the keypad but the digits above the letter keys. If you want a decimal value, type the appropriate decimal character (e.g. point for English, comma for French etc...)

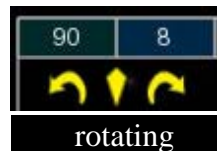
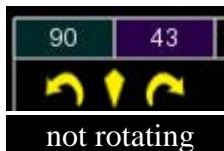
Validate with the "enter" key or by clicking elsewhere.

If you enter nothing (or anything else than a valid number) then the rotation is not limited and you have to stop it with the yellow center button. The display become ">>>"

e) rotation speed (in degrees per second)

You can increase or decrease this speed by clicking to the right or to the left of the number.

The color of the background color changes when you are actually rotating.



f, g, h, i) displacement control

f) Default speed. If you click here, the speed is reset to the default speed depending of the distance of the reference object.

g) Engine power. The number is a multiplier of the default speed (see the speed management below). You can increase or decrease this number by clicking on its right or on its left. This way you can increase or decrease your speed. The actual speed is indicated at the bottom left of the screen. The actual movement has to be initiated by clicking on one of the displacement arrows or by pressing [w] or [q].

The color of the background changes when you are actually moving.



h) travel distance

By default the distance to cover when you press a displacement arrow is not limited and you have to press one of the red button or press the [s] key to stop. This is indicated by ">>>" in this field.

If you want, you can enter a specific value. The method is the same as for the angle of rotation (see "d")

i) distance unit

Click here to specify the appropriate unit.

Available values are meters (m), kilometers (km), astronomical unit (au) and light year (ly).

j) Click this little square to show or hide the speed at the bottom left of the screen. This is useful to have an empty screen for a screen snapshot.

Speed management

If there is a reference object, the default speed is calculated from the distance of this object.

A reference object is an object that you follow, chase, or around which you are in sync orbit. To be selected or tracked is not enough to be a reference object. By cons, a reference object doesn't have to be selected to be taken into account.

The speed increases with the distance of the reference object. This way, if you are traveling to your target from afar, you start at a high speed to finish at a reasonable speed when you are near it.

Changing the speed by increasing the engine power doesn't actually make you start.

You really begin to move when you click on an arrow or if you press the [w] or the [q] keys.

The actual speed is displayed at the bottom left corner of the screen. This replaces the celestia default display.

The color of the display shows how the speed is managed.



Green: the ship moves and speed is controlled by the plug-in.



Red-Orange: you are stopped. The speed between the parentheses indicates the speed at which you will start. You can change this speed by clicking before or behind the engine power number of the manoeuvre tool (g)



The well known Celestia color: you started to move with the "a" key or F2 to F7. Speed is not controlled by the plug-in . Use preferably the keys "w" or "q" or the arrows on the manoeuvre tool.

You can disable the speed display by clicking the small button at the bottom left of the manoeuvre panel (j).

Tracking when moving

[Shift + T] defines or deletes an object that must remain centered during travel.

This function allows you to keep an object centered during the movement of the observer. Unlike the Celestia's "track" feature, the observer doesn't have to move in the direction of the target object.

To select the target:

- Select the object to track by clicking on the object or by typing its name in the input window of Celestia.
- Press **[Shift + T]**

The selected object is written in blue just above the speed indicator



If the observer is moving (green indicator), the selected object gets centered and then remains at the center of the screen while the original path is preserved.

If the observer is stationary (orange-red indicator) there is no immediate effect. Centering begin as soon as the observer will move. This allows for example to boot to the side of an object to monitor and fly without crashing.

Most often, the object to track is the reference object, but it is not mandatory. If there is no reference object speed remains constant while flying.

Reset the view ahead

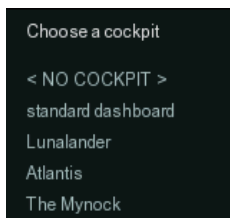
[Shift + R] When the direction of the view is different from the speed direction, you can reset the view in the direction of the movement by typing these keys.

This works only if you are moving.

If you were tracking an object (see above), this object is no more tracked.

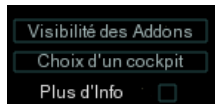
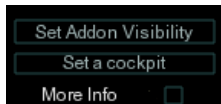
Cockpits usage

With lua_plug-ins, you launch Cockpits by pressing the **[shift + Z]** key. A menu like this appears and you can choose a cockpit by clicking on it.



The menu is automatically closed when you make a choice.

With **Lua_edu_tools**, you can press the **[shift + Z]** keys or click on a button to show the same menu



Note that it may be localized

The same menu as above appears (possibly translated)

[shift + W]

When a cockpit is loaded, you can hide or show it punctually by pressing these keys.

The cockpit and the cockpit tool remain active though not visible.

Multipanel cockpits

Multipanel cockpits are made of several panels corresponding to different view directions inside or outside the cockpit.

When you change the panel, the view direction changes accordingly but if you are moving, the direction of the movement remains the same.

If a multipanel is loaded, a new little command appears.



This multipanel cockpit tool allows switching between the different views of the cockpit.

Some of the arrows may be shown or not depending of the cockpit and the actual view.

The central point let you return to the front view or if you are already in front view go to the rear view if any.

You can move this view command everywhere you want on the screen.

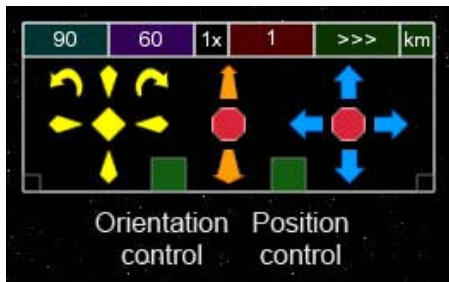
If you are loading a multipanel cockpit for the first time, it may take some time. You are warned with a message.

3D cockpits

3D cockpits are full 3D models and the cockpit is actually only the command center of the spaceship that you can pilot and place anywhere you want.

You can even park your vessel at a place and travel to another spaceship to take control of it.

When you choose a 3D cockpit, you have two new buttons in the navigation tool:



The first one locks/unlocks the orientation, and the second controls the position.

When the orientation or the position is locked, these buttons are green, and when unlocked they are brown.

Orientation control.

This is independent of the chosen way to rotate the view (with the keyboard arrows or the mouse to keep the view bounded with the direction of the speed / or by clicking the rotation icons of the navigation tool to change the view independently of the direction of the speed)

When locked (green), the cockpit direction is the same as the view direction.

When unlocked (brown) the cockpit keeps its orientation in space whatever the view and speed directions.

When stopped, pressing **[shif + R]** returns to the front view. Otherwise it aligns the direction of the view with the direction of the speed as usual.

Position control.

This is the position of the pilot in the cockpit.

This control is only available when you are stopped.

When the position in the cockpit is locked you can drive your spaceship safely.

When unlocked you can set your point of view in the cockpit.

Be careful: it is easy to be taken away and then it is difficult to recover the right position.

- You follow your cockpit only in the reference frame. If you change the reference frame you suddenly move at high speed and you end up far from your ship.

Selecting and Leaving a 3D cockpit

The first time you choose a cockpit, you get it at its default position as defined in the ssc file.

You can't leave a 3D cockpit if it is still moving.

Generally, when you leave a cockpit (by choosing <NO COCKPIT> or another cockpit) it disappears and the new cockpit (if any) appears.

You can force a cockpit (and the spaceship around it) to stay in place and visible while another cockpit is active.

To do that, just leave it with orientation and position unlocked.

It is as if you parked with your vehicle. Its reference frame is the frame at the moment you entered

in unlock position mode.

You can take the control of this cockpit whenever you like, just by selecting it in the cockpit menu.

Speed management with 3D cockpits

In most cases, the plug-in manages the speed according to the reference object as usual.

When the position is unlocked, it is sometimes dangerous to change the reference object.

In this case the speed is managed according to the selected object:

If the selected object is a spacecraft, the speed is not managed automatically. You must set it yourself (with “w”, “z” or the power window of the manoeuvre tool)

When you enter in unlock position mode, the cockpit itself is selected to avoid excessive speeds.

To learn more about 3d cockpits usage:

Read the corresponding topics in the Celestia forum and ask questions if you have any problem.

IV. Installing new cockpits

If you download a cockpit just unzip it in the panels directory

If you make your own cockpit, follow these instructions:

Simple panel

Just put the picture of the cockpit in the «panels» directory.

The picture is an image whose format is PNG

Cockpit with multiple panels

Create a sub-directory in the "panels" folder whose name is the name of the cockpit.

In this new directory, put all the png images of the panels, named with the name of the cockpit, a hyphen and a number. The number begins from 1 and increases for each panel clockwise.

Then in this same directory, you will have to create a description file for your cockpit whose name is the cockpit's name with the extension **.lua**

For example you want to install a cockpit whose name is "my_cockpit" with 6 views.

- Create a sub-directory "my_cockpit" in the "panels" directory.

- Put the 6 png textures of the views in this directory

my_cockpit-1.png,

my_cockpit-2.png,

...

my_cockpit-6.png

- Always in this directory, define and complete (see below) a file with the name my_cockpit.lua

3D cockpits

For instance there is not «ready for use» 3D cockpits.

In fact, you can use any model of spacecraft you want from an existing add-on. (or make the add-on yourself)

You have to load the model which is the base of the 3D cockpit and then:

- create the description file (see below)

- modify the ssc file of the original add-on
- add the control file of the 3D cockpit

You will find template ssc and the corresponding control files here

[panels3D1control.zip](#)

examples are available in the Celestia forum here:

<http://www.shatters.net/forum/viewtopic.php?f=23&p=132702#p132598>

Do not hesitate to ask questions in the forum if something doesn't work as expected!

Registering a new cockpit

Most of known cockpits are already registered in the file "cockpits_config.lua"

If you have a brand new panel, just add its name in this section.

```
known_cockpits_files={
  "cockpit",
  "cockpit_lunalander",
  ...
  "my_cockpit", -- line to add to include your cockpit
}
```

The names written here are the texture files without the extension (.png) and without the numbers for the multipanel cockpits.

There is one line for one cockpit, even if the cockpit has several panels.

For example "my_cockpit" stands for the six files in the "panels/my_cockpit" directory of your cockpit.

V. Description file of a cockpit

This file is only necessary for the multivue and 3D cockpits.

It has to reside in the panel directory in a directory with the same name as the cockpit.

Description file for a multipanel cockpit

For example this is the description file for the "beepilot" cockpit

Its name is beepilot.lua in the beepilot directory.

```
beepilot = {
  panelratio=8/5;      -- generic name of the panel is mandatory
  vfov=50;             -- cockpit picture width / picture height
  rearpanel = 8;       -- default vertical field of view (FOV) in degrees of the cockpit
                      -- "beepilot-8.png" is the rear view

  image = {            -- there is an image on the panel #7 (front up view)
    [7] = {"photo.jpg", 0.427, 0.79, 0.05, 0.11},
  },

  displacement = {    -- fictive example
```

```

    [9] = { 0, 20, -30}, --panel #9: ext view 20m above, 30m behind
},

orientation = {      -- if omitted we have evenly horizontally spaced views
    {0,0},           -- #1 front view
    {1.5,-25, 35},  -- #2 command panel FOV = 35 degrees (default is 50)
    {50,-17},       -- #3 right view (17 degrees down)
    {80,0},         -- #4 right side view
    {280,0},        -- #5 left rear view
    {310,-17},      -- #6 left view
    {0,30},         -- #7 front up view
    {180,0},        -- #8 monitor view showing backward
},

viewpath = {        -- panel link for the arrows {left,right,up,down}
    -- if omitted the views are linked sequentially
    {6,3,7,2},      -- #1 is linked to #6, #3, #7 and #2
    {6,3,1,8},      -- #2 is linked to #6, #3, #1 and #8
    {1,4,7,2},
    {3,8,0,0},      -- #4: no link for the up and down arrows
    {8,6,0,0},
    {5,1,7,2},
    {6,3,0,1},
    {4,5,2,0},
},
}

```

Other customizations are possible as well

Multipanel cockpits parameters:

These parameters are only for the multipanel cockpits.

panel_ratio : is the original proportion (width/height) of the cockpit image. It should match the screen ratio.

vfov : original vertical field of the panel

panel_ratio and **vfov** are useful to keep the horizontal field of view of the cockpit consistent with the outdoor. This is important to keep a correct perspective so that an object is at the same place through the different windows of the cockpit if the views are overlapping.

firstpanel : number of the first panel to display when a new cockpit is loaded. (Default #1)

frontpanel : number of the front panel. It is the panel displayed when you click on the central button of the multipanel cockpit tool. (Default #1)

rearpanel : number of the rear view panel. (No default)

Image : you can add an extra image on each panel. The parameters are the name of the picture file,

X and Y position, Width and Height of the picture on the panel.

If numbers are greater than 1, the sizes are in pixel, otherwise it is a ratio of the width or the height of the screen.

“**orientation**”, if not specified the views are evenly spaced clockwise.

Otherwise, one line per view is required.

The first two parameters (angles to right and up) are mandatory. The third (FOV) is optional.

displacement : useful to have an external view panel. For each panel indicated between [], you indicate the x, y, z coordinates of the displacement. Distances are given in meters. "x" is negative to the left and positive to the right. "y" is positive upward and "z" is positive ahead.

Description file for a 3D cockpit

For example this is the description file of the **workbee3D** cockpit

```
workbee3D = {  
    cockpit3D = true;           -- mandatory declaration  
    model3D = "Workbee";       -- model name from workbee3D.ssc  
    SolarSystem = "Sol";       -- same star as defined in workbee3D.ssc  
    fov = 50                   -- optional : default FOV for this cockpit  
}
```

The first three parameters are mandatory.

VI. Customizations

You can change some settings of the plugin such as the default keys.

Look at the file "**cockpits_config.lua**" and modify the required items.

This file is well commented to help you to customize it.

VII. Credits

Thanks to Vincent for the Lua Plug-ins and Lua Edu Tools.

The modules pCXXBox, _textlayout and plugins_locale are directly derived from the corresponding modules of Lua Edu Tools.

Thanks to those who have provided the original 3D models from which I made some multipanel cockpits.

The example referring to the beepilot comes from the cockpit that I have made from a model by fungun.

The original beepilot model is part of the [StarbasesV2 add-on](#) by fungun.

Thanks for localization to

- Marco Klunder : Dutch
- alexell : Russian
- Guckytos : German

VIII. License

Just as Lua Plug-ins or Lua Edu Tools without which it could not operate, this plug-in can be freely used/copied/modified/distributed for non-commercial activities..