FLY! LEGACY

USER GUIDE

Version 1.1

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Fly.Simvol

http://fly.simvol.org

Proloque:

Fly! Legacy is a 100% free flight simulator, without limitation, open source and participative developed by flight simulator enthousiasts (Fly.Simvol).

The concept of the Fly! Legacy software (written in C++) has a very structured base, and contains hundreds of very detailed object classes (pitot, electrical, propellor, …).

This allows continuous improvement and contributes to the realism of the simulation.

Fly! Legacy needs a standard PC, with a graphic card supporting OpenGL 2.0 or higher and Windows XP at the minimum.

It supports most common hardware (joystick, pedals, yoke …) on the market, although we were not able to test all the hardware.

Fly! Legacy (version 1.2.7) contains as standard:

- The aircraft:
    - The Cessna 172 SP, in middle and high definition.
    - In the future, more aircraft are expected.
- The scenery:
    - World coverage by generic textures and DEM (Digital Elevation Map)
    - World coverage which is suitable for flights, flight planning.
    - World coverage of airports: runways and taxiways.
    - Detailed airports and surrounding scenery: Chambéry and Annemasse.
    - Downwards compatible with most of the existing Fly !II scenery.
- Several integrated tools (some examples):
    - *City Editor:* a superb editor, which allows us to generate, within a few minutes, thousands of 3D objects based on data from Openstreet: http://www.openstreetmap.org
    - *Terra browser:*   to consult the landclass textures of the scenery.
    - *Object browser*: to consult the 3D objects of the scenery.
    - *Terra editor:* to edit the DEM (Digital Elevation Map) of the scenery.
    - *Flightplanner:* to generate or edit a flightplan.
    - *Vector Map:*   to consult navaids, documents (VFR/IFR), flightplan …
    - *SDK (Software Development Kit):*   to allow application development.
- Modular structure to support compatibility with external tools:
    - *Legacy Editor:* software for import/export of Fly! Legacy data.
    - *Legacy Navigator:* preparation of Fly! Legacy flightplans.
    - *Legacy Scenery:* creation of 2D and 3D scenery.

      Possibility to import 3D objects in Collada (Google Earth) format.

Content of the Fly! Legacy User guide.

Chapter 1

Installation of Fly! Legacy

Chapter 1: Installation of Fly! Legacy

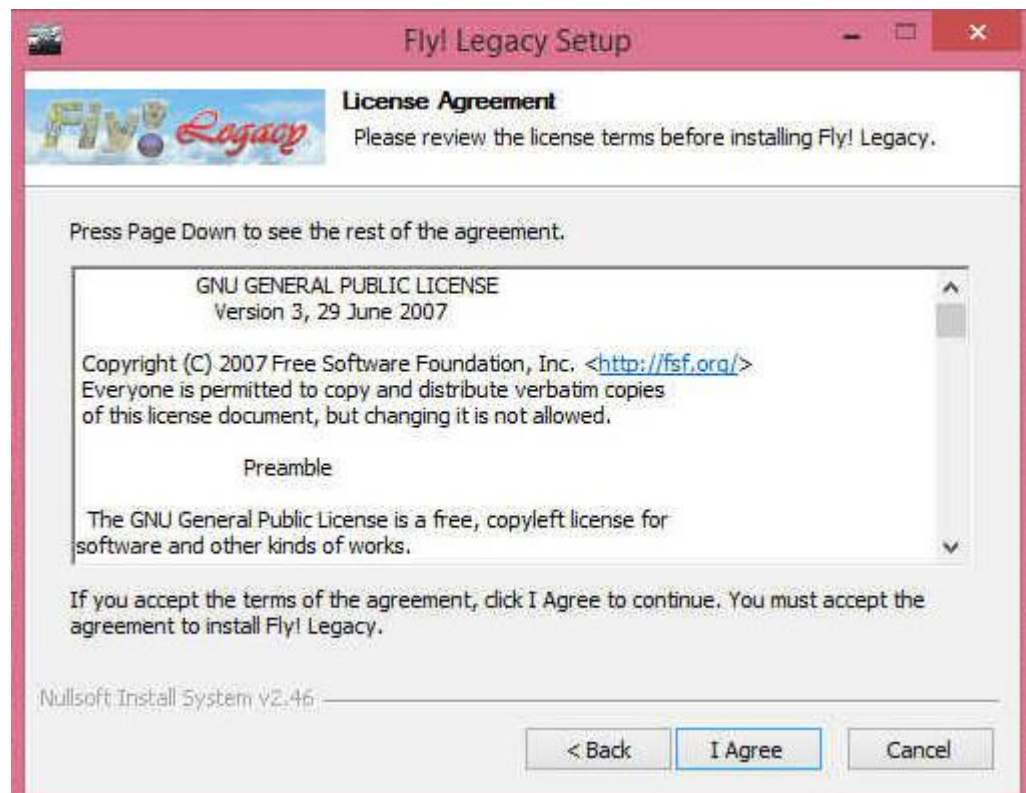Get the latest version of Fly! Legacy available at: http://fly.simvol.org/
It is a compressed file (For example: FlyLegacy_1.2.7.zip).
Unzip this file in a backup directory. A sub-directory FlyLegacy_1.2.7 is created.
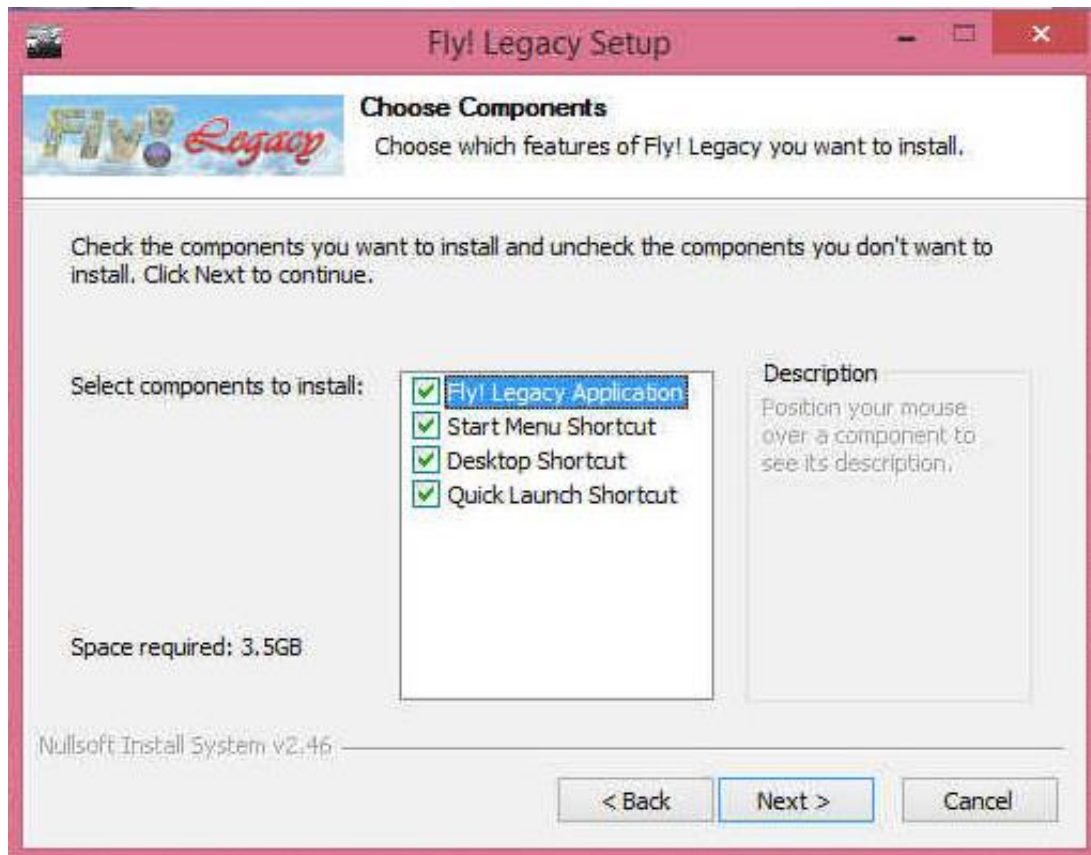In this directory, start the executable "Setup.exe". The occupied disk space is +/- 3,5 GB.
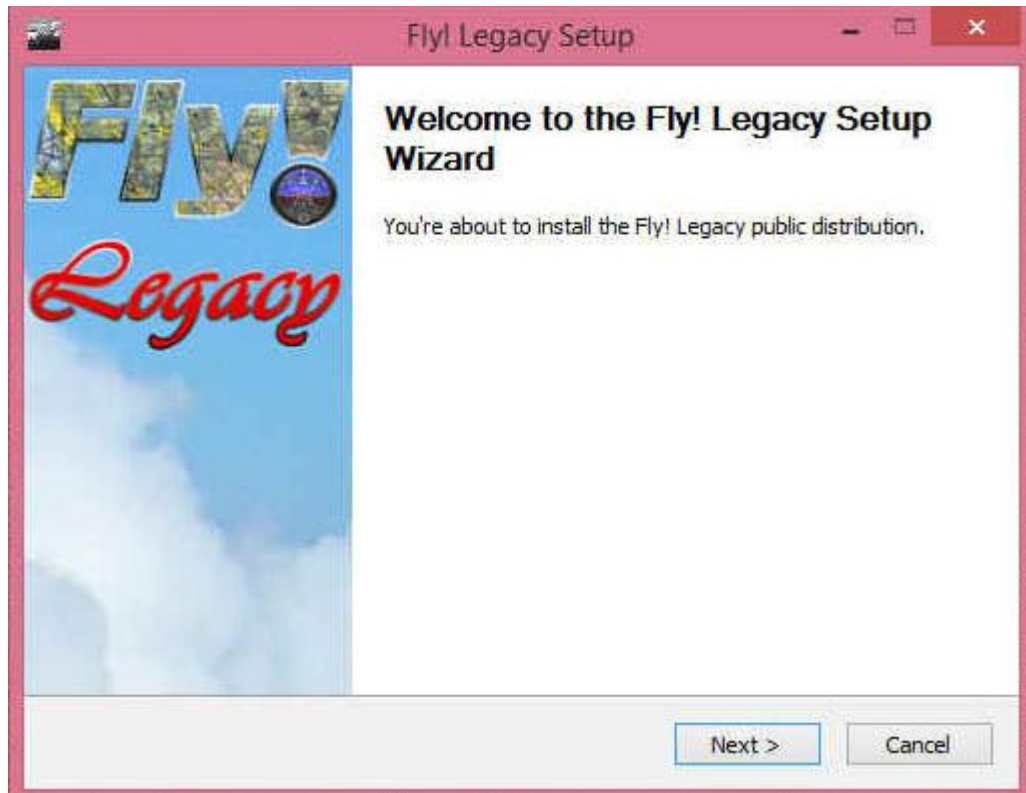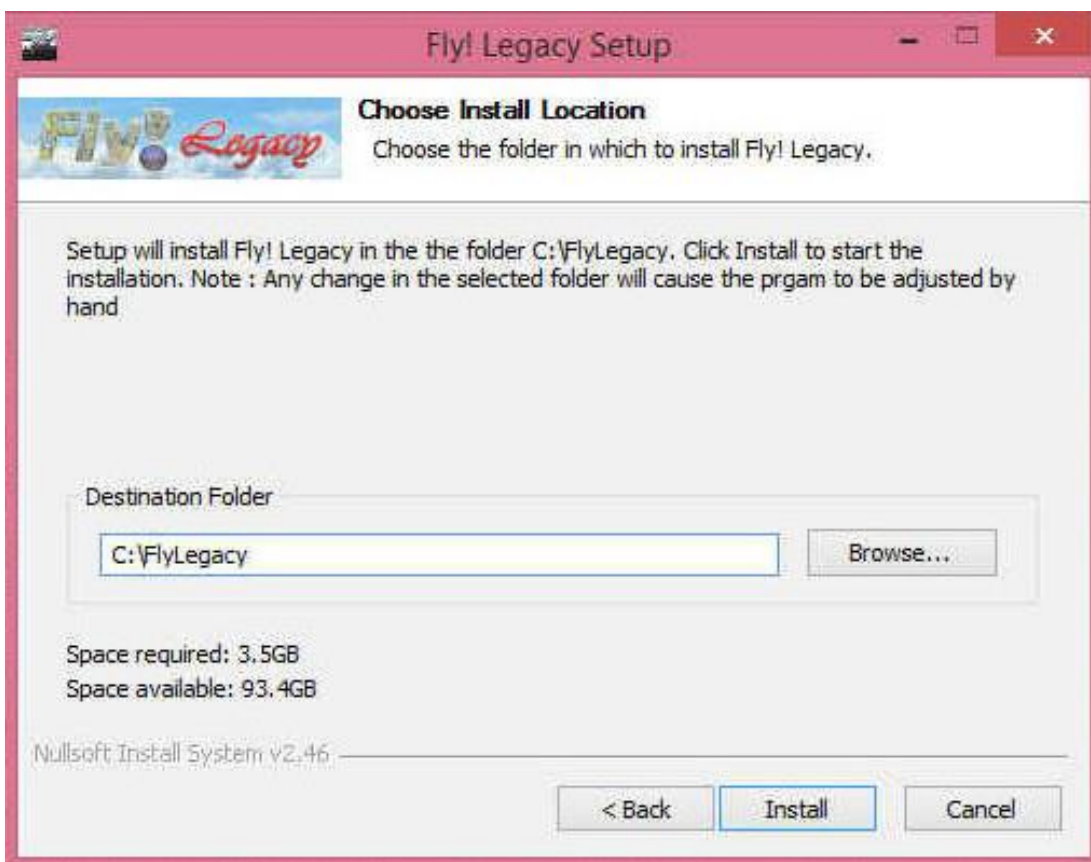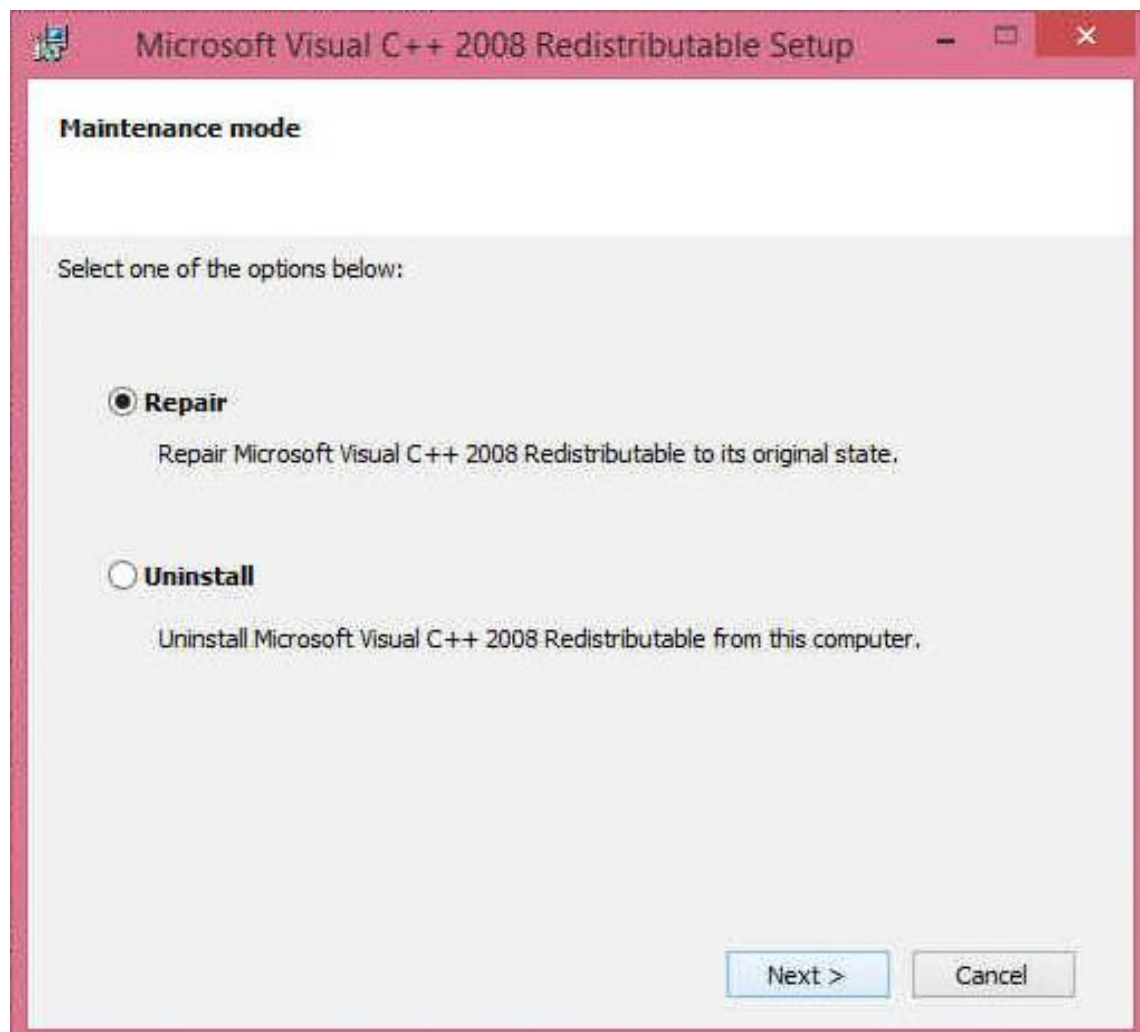

Confirm: «Next»

Confirm: «I Agree»

You are able to select the components to install.   Confirm: «Next».

By default the software will be installed on the C-drive under c:\FlyLegacy.

Confirm: «Install»

By preference, select «Repair»
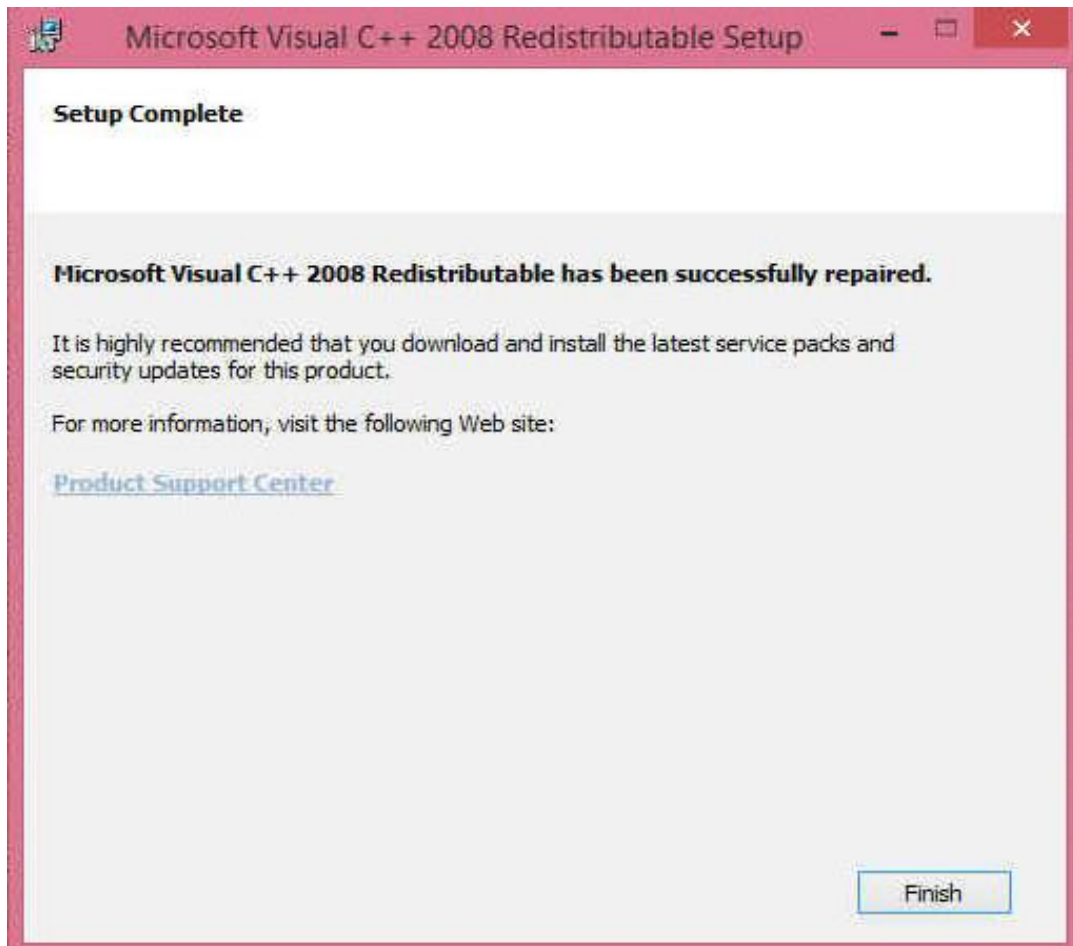
> The C++ libraries on your computer will be verified and if needed updated
> for Fly! Legacy.

Option «Uninstall»

> Remove the remaining C++ libraries on your computer, and re-installs
> the C++ libraries required by Fly! Legacy.

Confirm: «Next»
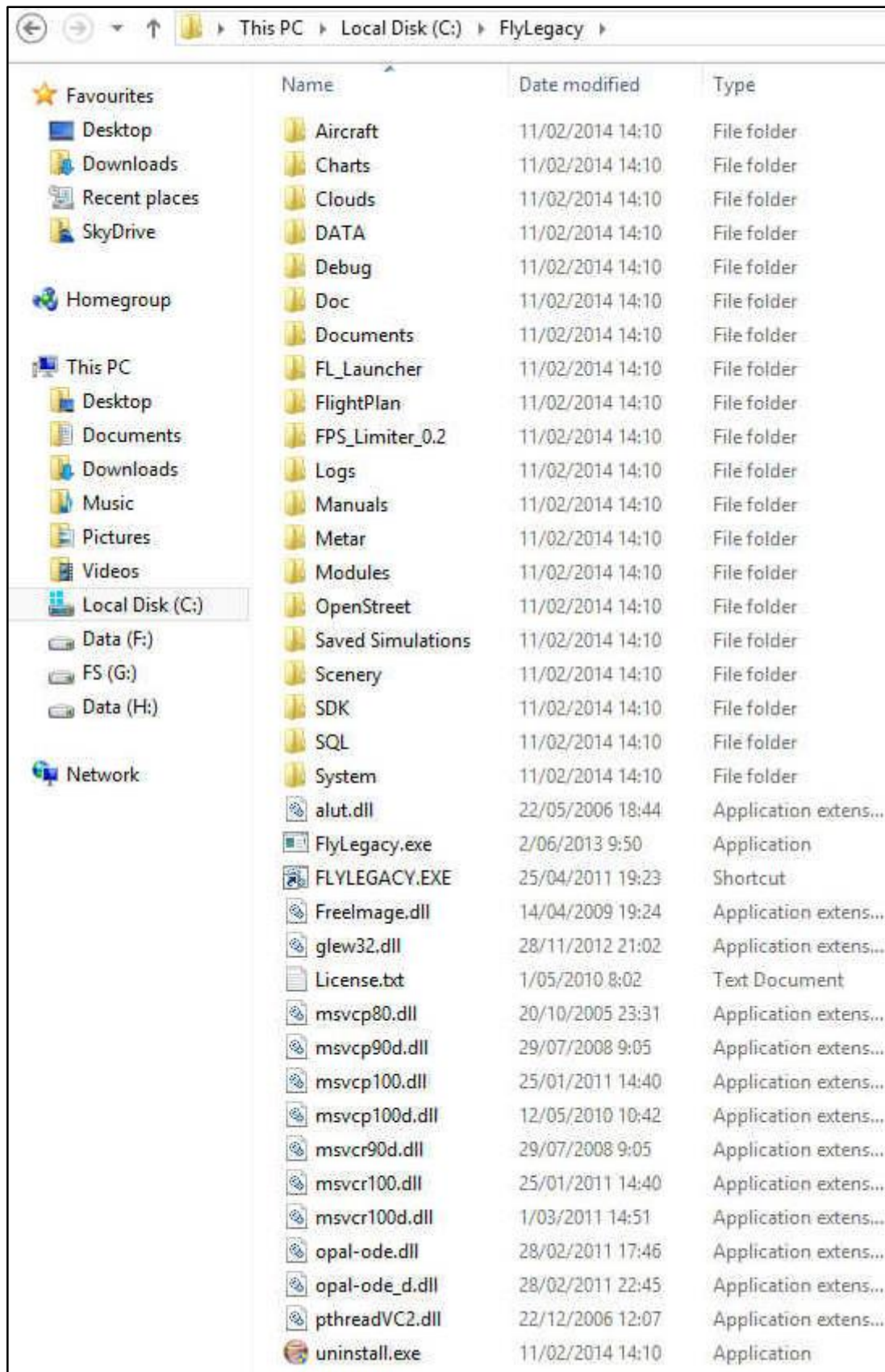
Confirm: «Finish»

Once the instalation has been finished, it is recommended to restart your computer, to activate the installed programs.

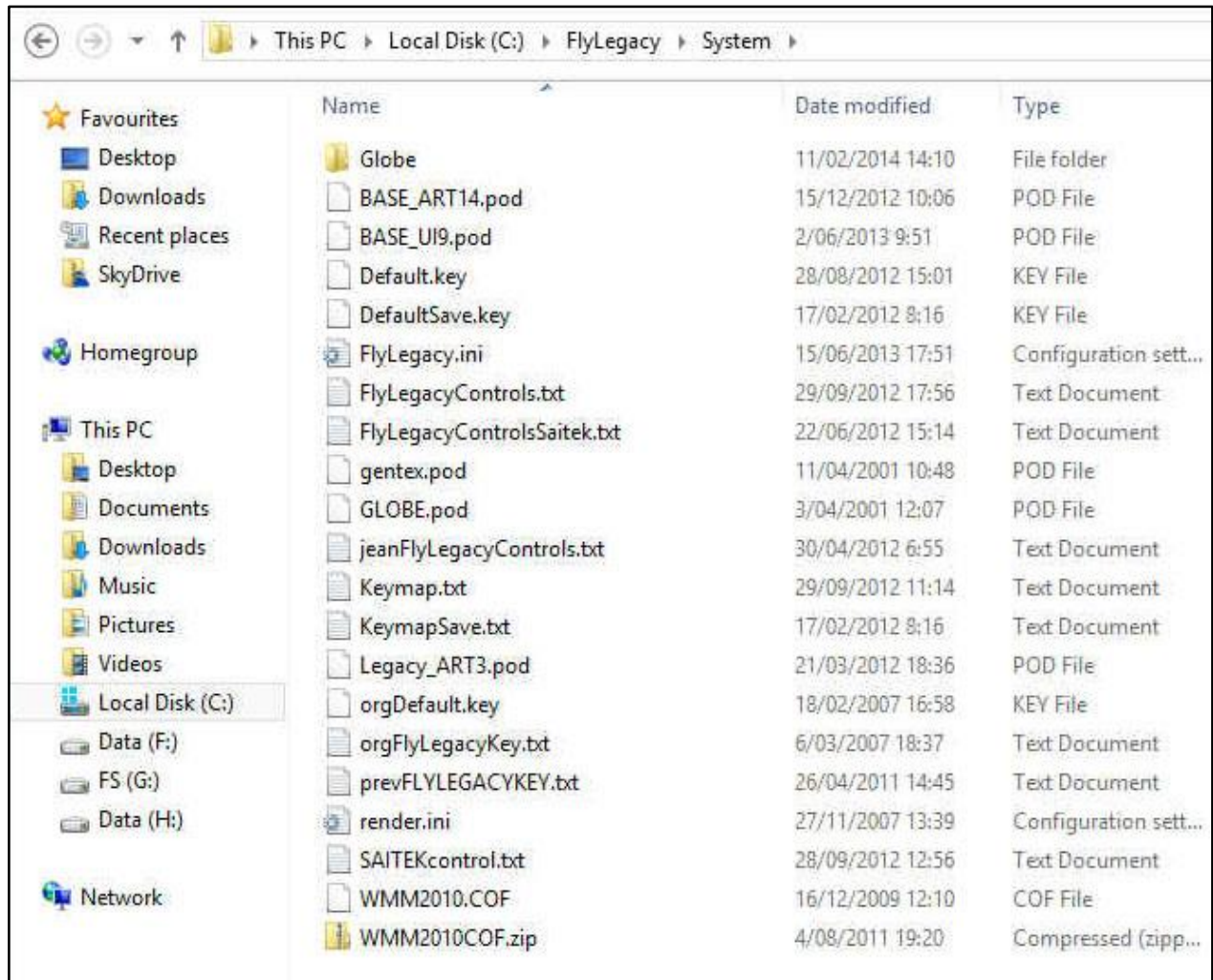The created directory is the following (Fly! Legacy version 1.2.7):

In case Fly! Legacy is not installed in c:\FlyLegacy but on another drive, we recommend to verify the "FlyLegacy.ini" file available in the sub-directory « System » of FlyLegacy.

Open the file «FlyLegacy.ini» with for example Notepad.

```
[OpenStreet]
QuickSave=0

[SQL]

ELVDB=C:/FlyLegacy/SQL
GENDB=C:/FlyLegacy/SQL
M3DDB=C:/FlyLegacy/SQL
OBJDB=C:/FlyLegacy/SQL
SEADB=C:/FlyLegacy/SQL
TEXDB=C:/FlyLegacy/SQL
TXYDB=C:/FlyLegacy/SQL
WPTDB=C:/FlyLegacy/SQL
OSMDB=C:/FlyLegacy/OpenStreet/Databases
SCENE=C:/FlyLegacy/Scenery

[Sim]
NoAircraft=0
NoAirport=0
```

Verify if the indicated paths in the SQL section are correct.

If needed, correct the paths.

If you have choosen the default install, and did not change the paths « ./SQL », you can change the lines indicated here above by the following lines:

```
[SQL]

ELVDB=./SQL
GENDB=./SQL
M3DDB=./SQL
OBJDB=./SQL
SEADB=./SQL
TEXDB=./SQL
TXYDB=./SQL
WPTDB=./SQL
RTEDB=./SQL
OSMDB=./OpenStreet/Databases
SCENE=./Scenery
```
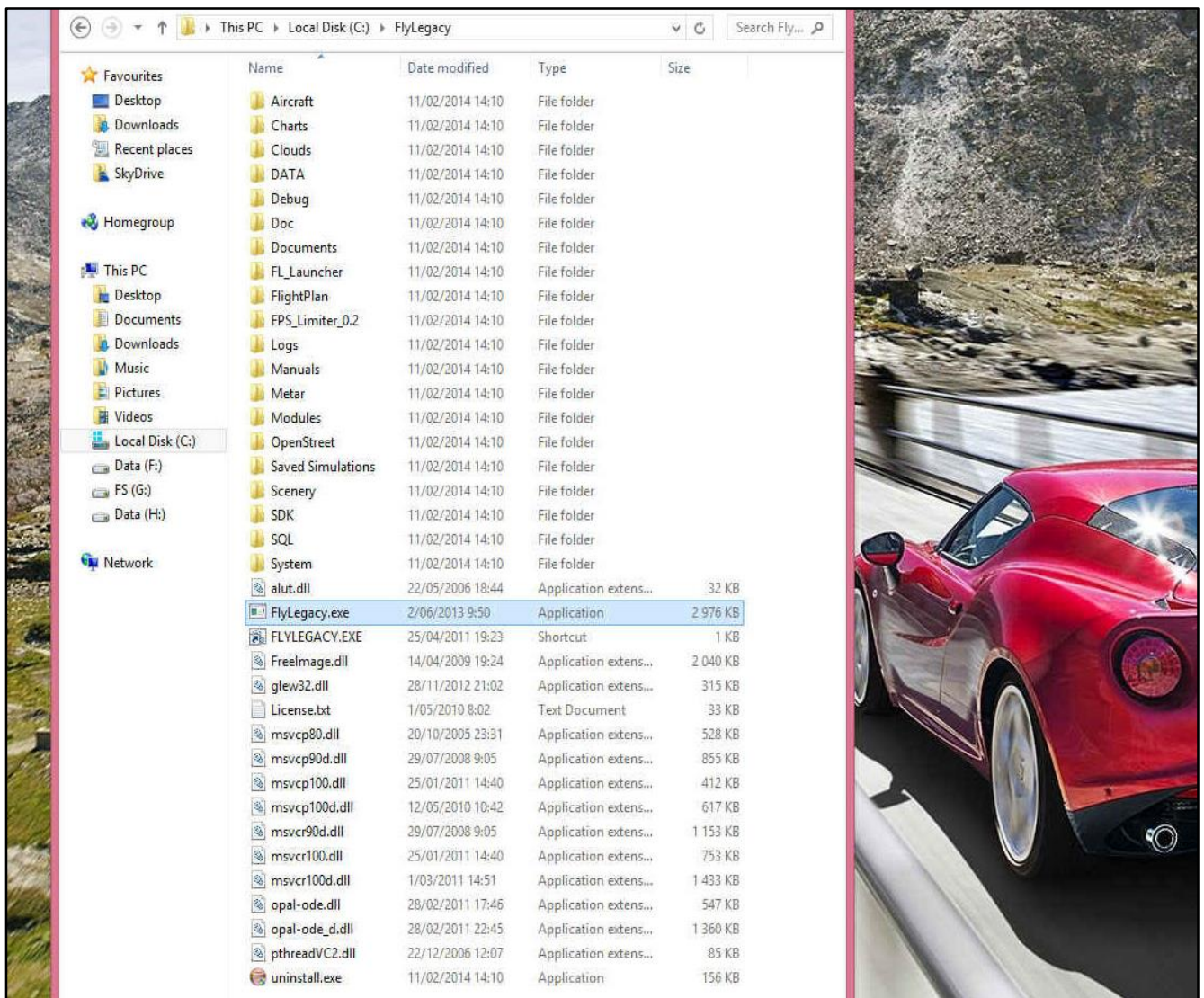

Double click on the FlyLegacy.exe to launch the application.

An introduction screen represents the superb Cessna 172SP in flight.

Next appears the cockpit.

The loading of the first external scenery takes some additional time.

Important remark: do NOT touch any button / mouse during this loading period.
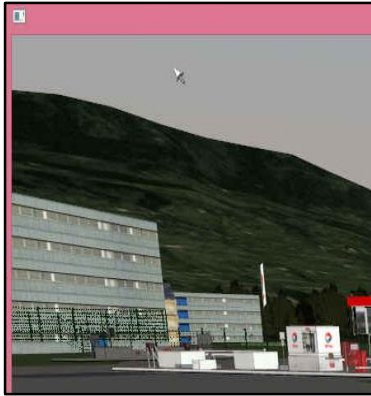
In case the menu-bar does not appear: press spacebar on the keyboard, and the menubar appears.

Remark (only valuable for less performant computers):
    By default Fly! Legacy 1.2.7 starts with the Cessna high resolution cockpit.
    To fly with the Cessna medium resolution cockpit, go to the
    menu VEHICULE – AIRCRAFT SELECT and select the Cessna (MD) 172SP.

The cockpit scrolls vertically when moving the mouse to the screen borders.
    Move the mouse to the upper border of the screen: the cockpit scrolls downward.
    Move the mouse to the lower border of the screen: the cockpit scrolls upward.

Horizontal scrolling is also possible, except if the screen width of your computer allows to display the total cockpit already.

The airplane is now nearly ready to fly.
We still have to assign the axes and buttons to the controller(s).

Chapter 2

Assign axes to controller (joystick)

Chapter 2: assign axes to controller (joystick)

We explain the example of 3 separate controllers: 1 yoke, 1 rudder pedals, 1 trim.

All controllers (joystick) need to be connected before starting Fly! Legacy.

Invoke the menu-bar (If needed press spacebar on the keyboard).

Click «Options» –> «Joystick»

The window « Setup axes » appears.
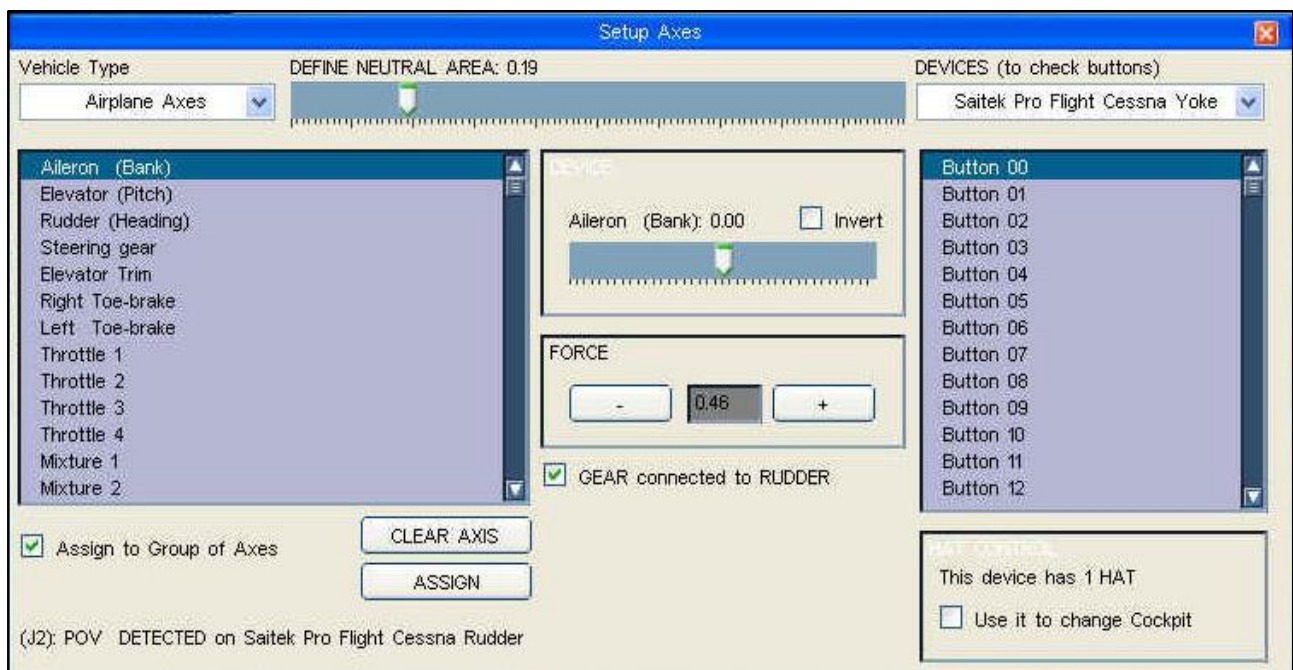
All the detected controllers appear in the list «DEVICES».

De-activate «Assign to Group of Axes»   (Activate only in case of multi-axis controller)

If the controller has a HAT feature: select «This device has 1 HAT» to activate it.

Assign the «Aileron» axe

Click in the list on «Aileron (Bank)» to select the axe.

Activate the controller by banking the Yoke.

> On the lower-left of the screen appears the name of the axe detected by Fly! Legacy.

Click on «Assign» to assign the axe to «Aileron (Bank)»
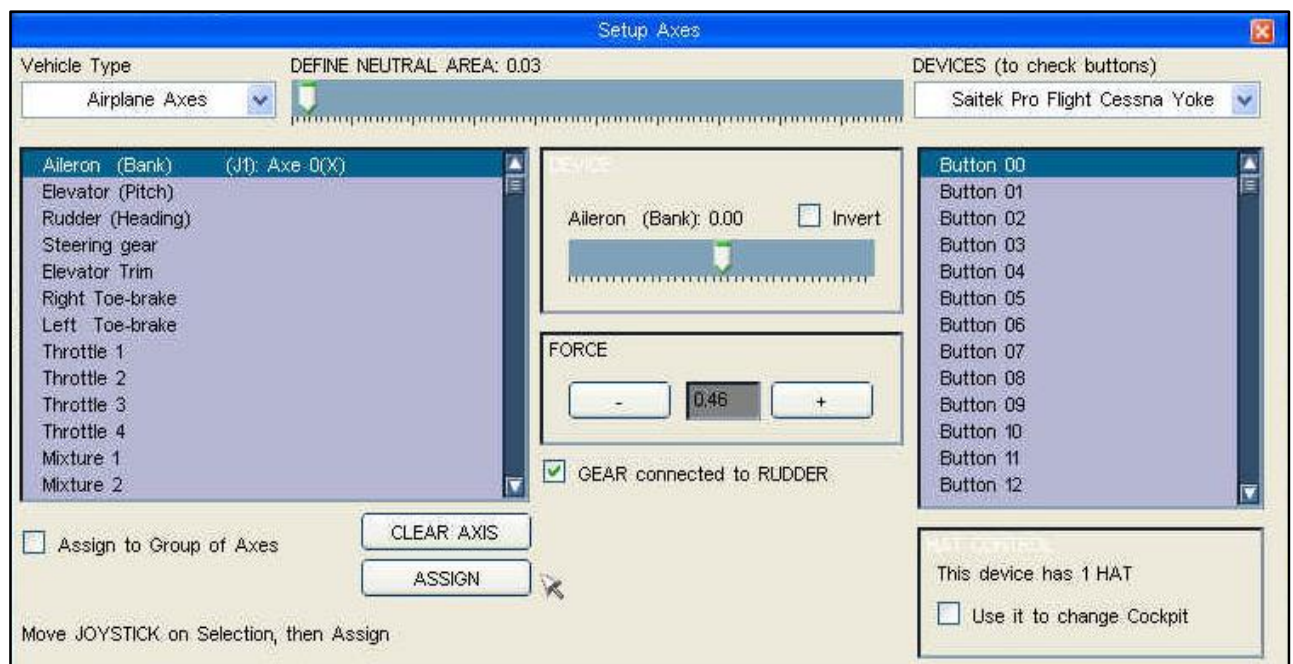
To change the direction of the axe: select «Invert»

To change the force of the axe: click on + or – to change the value «Force»

To adjust the neutral zone of the axe: move the slider «Define neutral area»

Remark: the assignment of the axes will be saved when quitting Fly! Legacy in a normal way.

Assign the «Elevator Pitch» axe

Click in the list on «Elevator (Pitch)» to select the axe.

Activate the controller (Yoke), to detect the name of the axe.

Click on «Assign» to assign the axe to «Elevator (Pitch)»
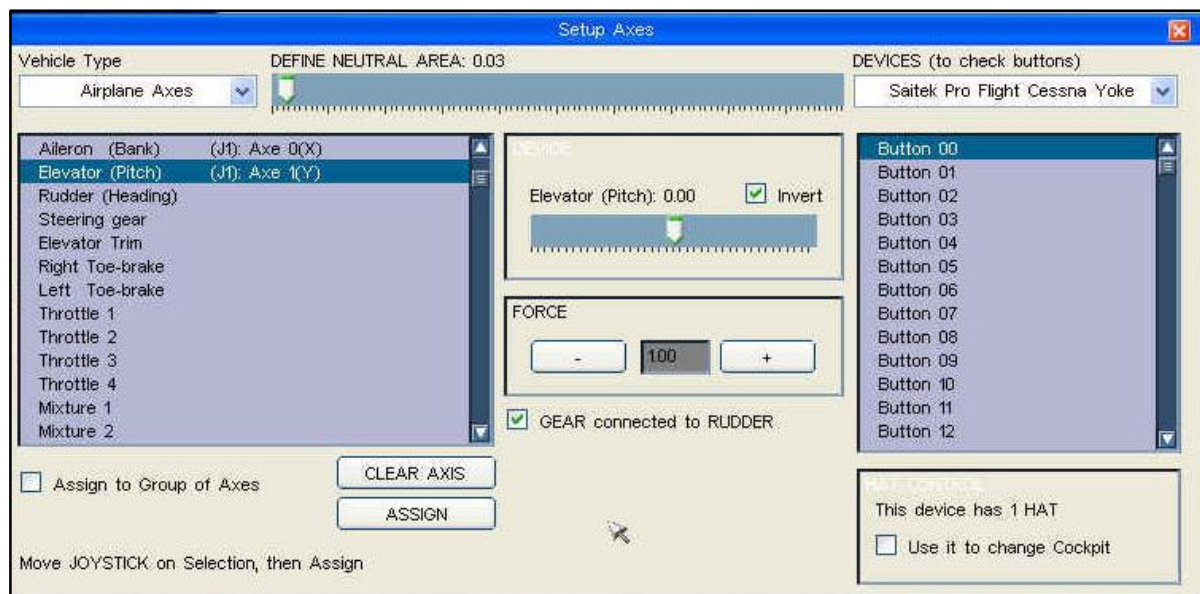
To change the direction of the axe: select «Invert»

To change the force of the axe: click on + or – to change the value «Force»

To adjust the neutral zone of the axe: move the slider «Define neutral area»

Assign the «Rudder (Heading)» axe

Click in the list on «Rudder (Heading)» to select the axe.

Activate the controller (eg. rudder pedals) to detect the name of the axe.

Click on «Assign» to assign the axe to «Rudder (Heading)»
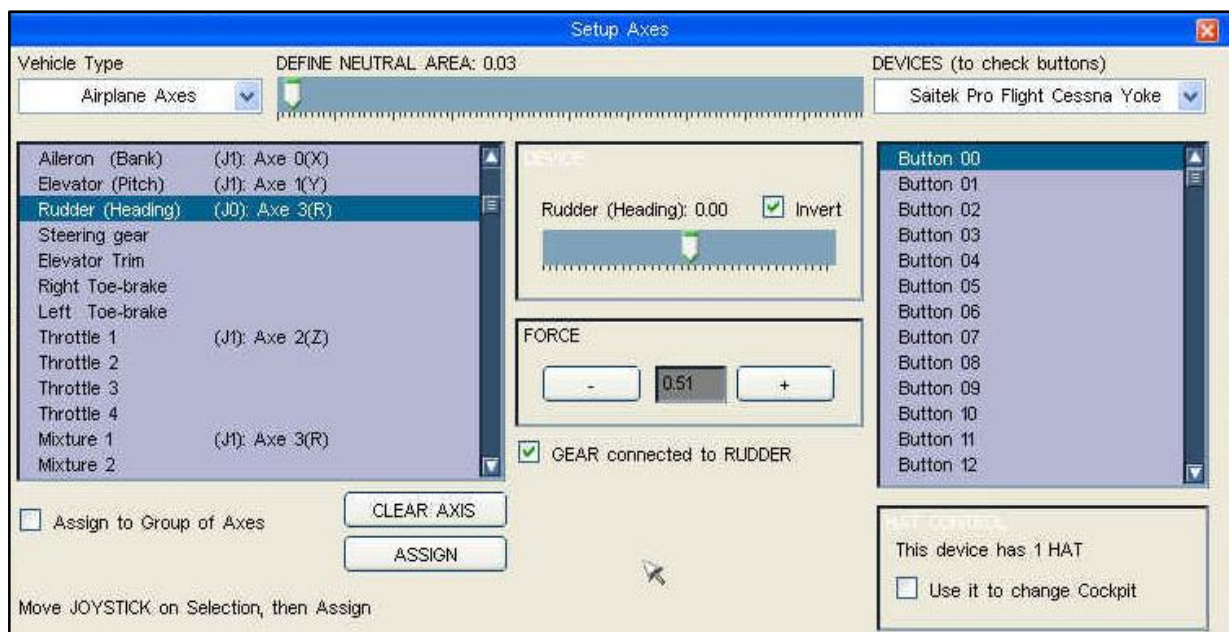
We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Right Toe-brake» axe

Click in the list on «Right Toe-brake» to select the axe.

Activate the controller (eg. right brake pedal) to detect the name of the axe.

Click on «Assign» to assign the axe to «Right Toe-brake»

We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Left Toe-brake» axe

Click in the list on «Left Toe-brake» to select the axe.

Activate the controller (eg. left brake pedal) to detect the name of the axe.

Click on «Assign» to assign the axe to «Left Toe-brake»

We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Throttle 1» axe

Click in the list on «Throttle 1» to select the axe.

Activate the controller (eg. Throttle lever) to detect the name of the axe.

Click on «Assign» to assign the axe to «Throttle 1»
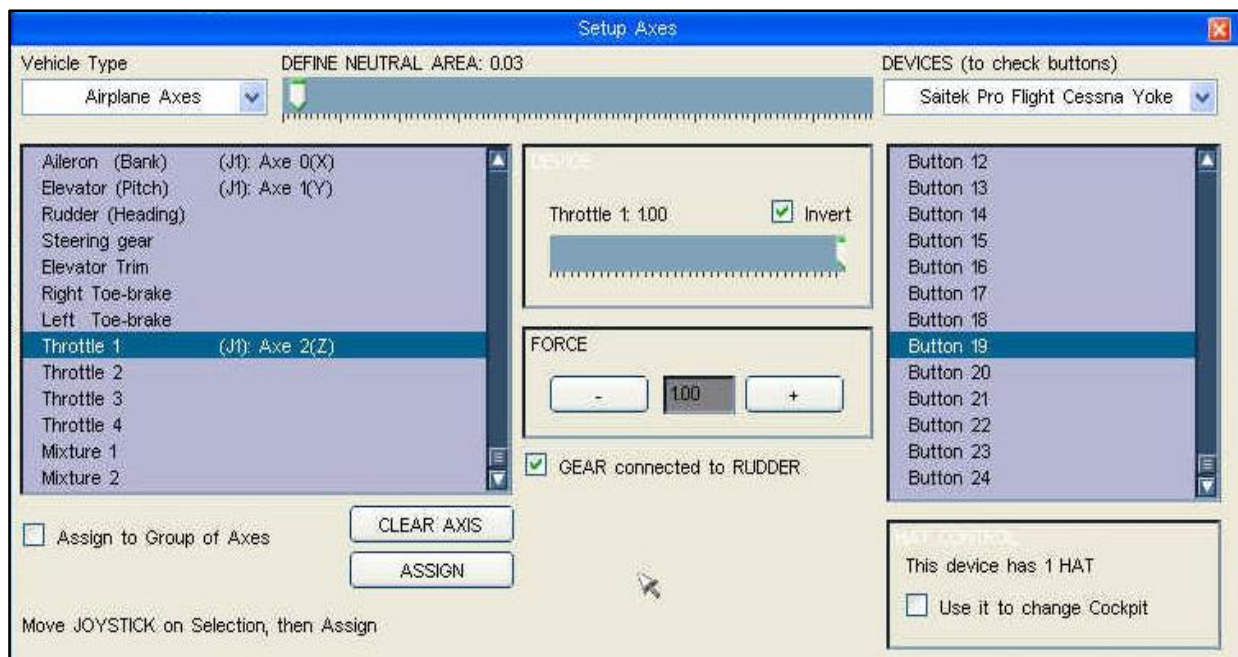
We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Mixture 1» axe

Click in the list on «Mixture 1» to select the axe.

Activate the controller (eg. Mixture lever) to detect the name of the axe.

Click on «Assign» to assign the axe to «Mixture 1»
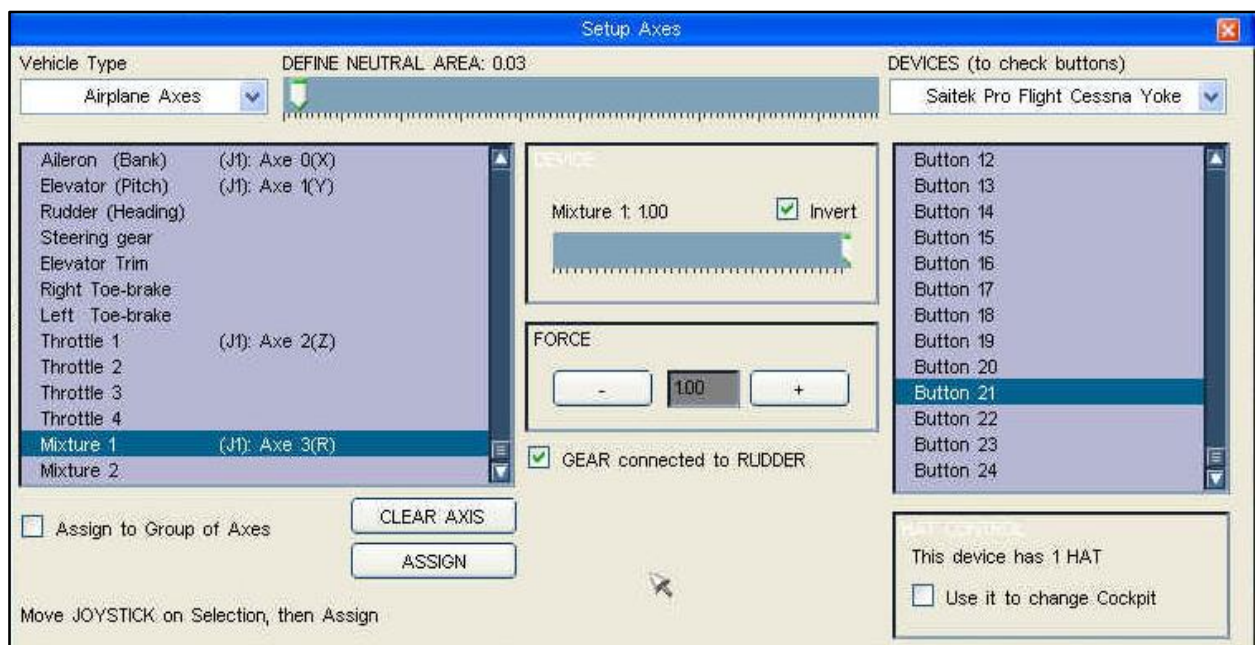
We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Prop 1» axe = (optional)

Click in the list on «Prop 1» to select the axe.

Activate the controller (eg. Proppelor lever) to detect the name of the axe.
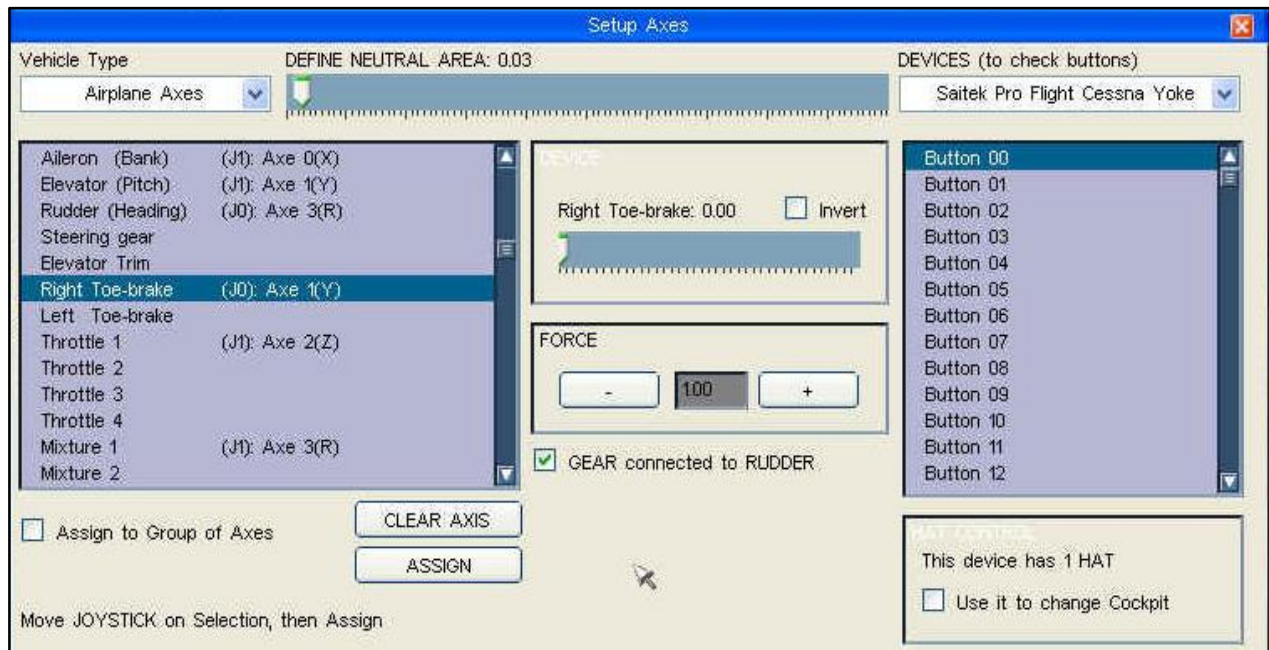
Click on «Assign» to assign the axe to «Prop 1»
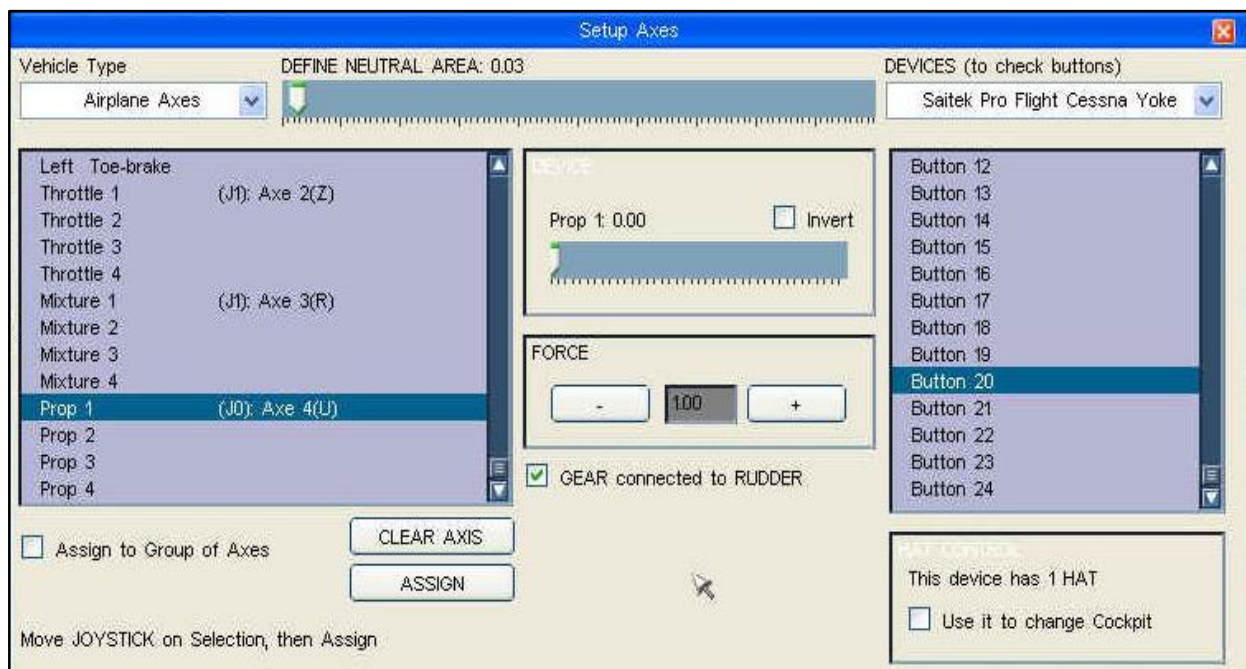
We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Assign the «Elevator Trim» axe (optional)

Click in the list on «Elevator Trim» to select the axe.

Activate the controller (eg. Rotate the Trim wheel) to detect the name of the axe.

Click on «Assign» to assign the axe to «Elevator Trim»

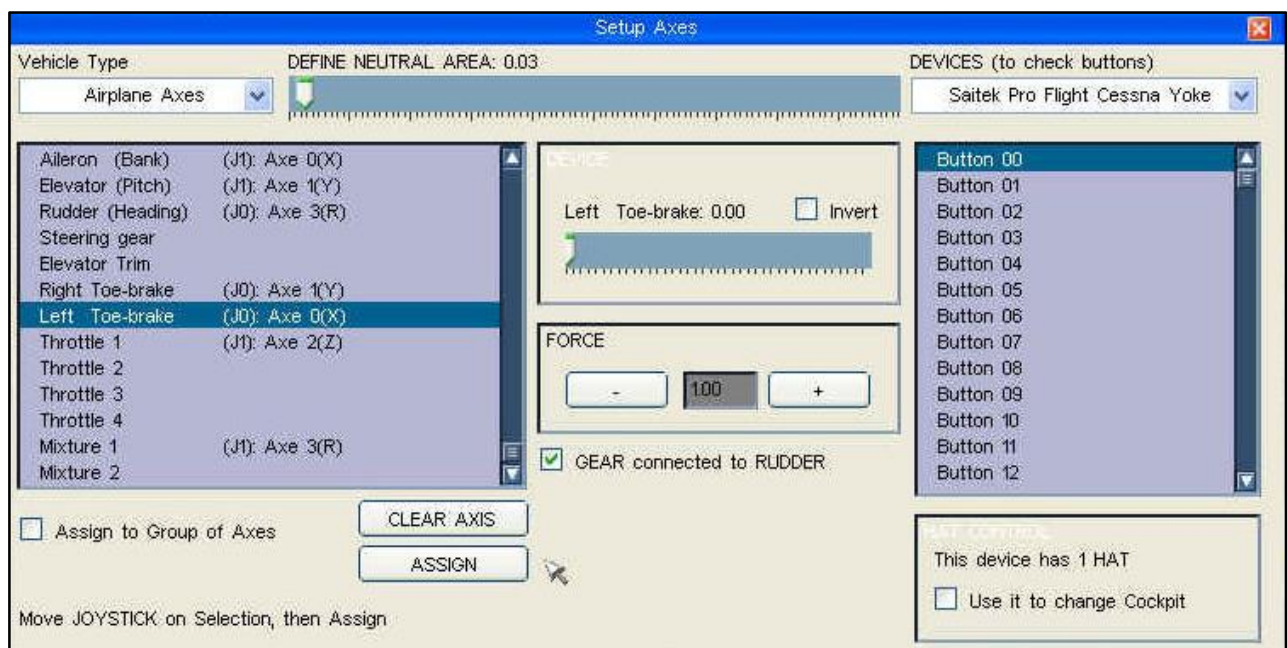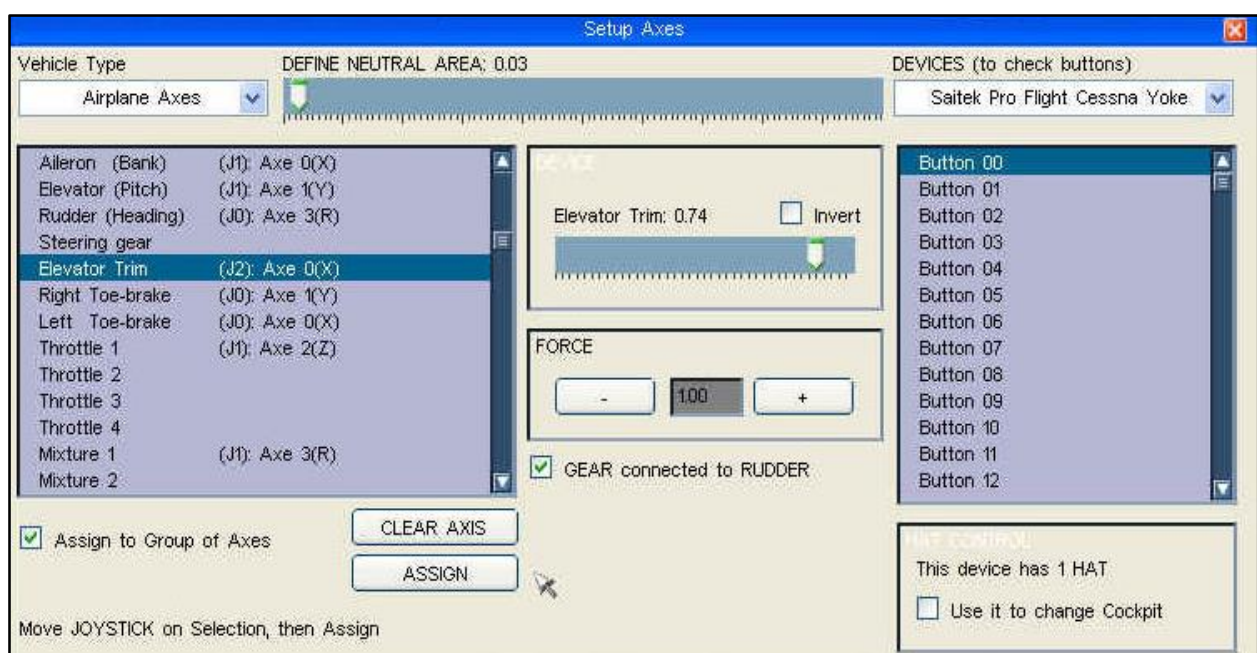

We might change the direction («Invert»), the force («Force») and the neutral zone (Slider «Define neutral area») of the axe.

Remarks regarding the assignment of controller axes

- Mark «Gear connected to rudder» if the front wheel is connected to the rudder pedals of the aircraft.

- The sytem performs an automatic controller recognition if the controller is activated.

- To remove an assigned axe: click in the list on the name of the axe.

  Then click «Clear axis».

- Remark: the assignment of the axes will be saved when quitting Fly! Legacy in a normal way.

Chapter 3

Assign actions to the different controller buttons

Chapter 3: assign actions to the different controller buttons

It is possible to assign actions to the different buttons of the controllers (joystick).

All controllers (joystick) need to be connected before starting Fly! Legacy.

Invoke the menu-bar (If needed press spacebar on the keyboard).

Click «Options» –> «Keyboard & Buttons»
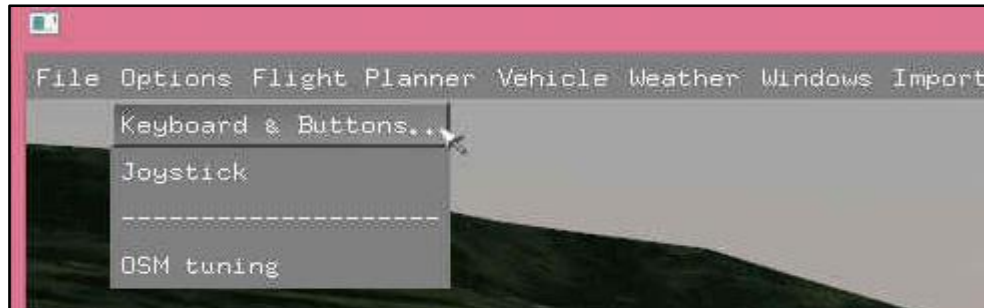
The window «Keys & Buttons» appears.

It is important to change the MODE to CHANGE KEY before assigning buttons !

Assign button: example «Brakes (Parking)»

Choose a button category: «Airplane Keys»

Click in the list on «Brakes (Parking)» to activate the item.
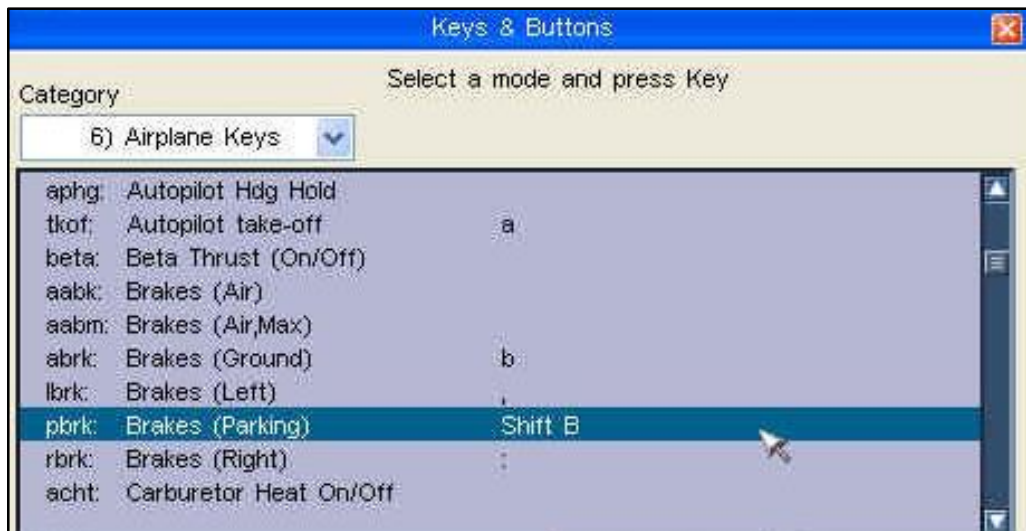
Press on the controller the button «*Parking brake*» , to assign it to the item of the list.

Remarks:
- The same procedure is applicable for the assignation of keyboard buttons.
- To remove an assignment of a controller button:
  - click in the list on the name of the button to be removed, to activate it.
  - click «Clear Button»
- To return to the default assignment of buttons:
  - click «Default Button»
- To remove an assignment of a keyboard button:
  - click in the list on the name of the keyboard button to be removed.
  - click «Clear Key»
- To return to the default assignment of keyboard buttons:
  - cliqck «Default Keys»

Assign button: example «Flaps (Extend)» and «Flaps (Retract)»

Choose a button category: «Airplane Keys»

Click in the list on «Flaps (Extend)» to activate the item.

Press on the controller the button *"Flaps (Extend)"*, to assign it to the item of the list.
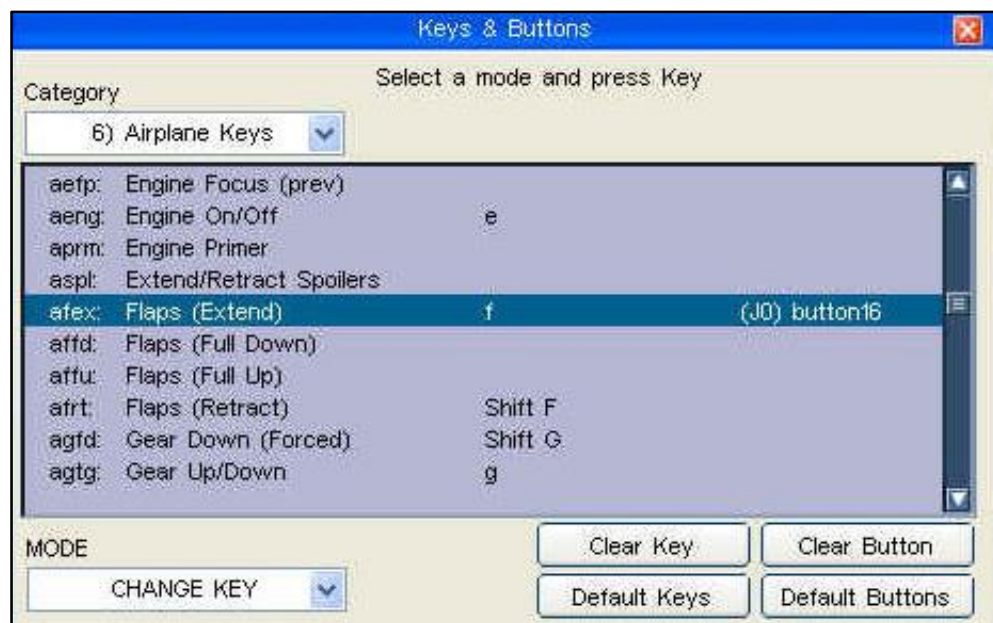
Click in the list on «Flaps (Retract)» to activate the item.

Press on the controller the button *"Flaps (Retract)"*, to assign it to the item of the list.

Assign button: example «Camera Control Box»

Choose a button category: «Camera Keys»

Click in the list on «Camera Control Box» to activate the item.

Press on a button of the controller, to assign it to the item of the list.

«Camera Control Box» allows to change the external viewpoint: rotate, range, zoom.

Assign button: example «Head Pitch Down (Cockpit)» and «Head Pitch Up»

This feature allows us to adjust the view angle from the cockpit.

Choose a button category: «Camera Keys»

Click in the list on «Head Pitch Down (Cockpit)» to activate the item.

Press on a button of the controller, to assign it to the item of the list.

Click in the list on «Head Pitch Up (Cockpit)» to activate the item.

Press on a button of the controller, to assign it to the item of the list.

Assign buttons: example
>   ***«Pan Camera Down»***
>   ***«Pan Camera Left»***
>   ***«Pan Camera Right»***
>   ***«Pan Camera Up»***

This feature allows us to turn the cockpit view: downward, to the left, to the right, upward.

Choose a button category: «Camera Keys»

Click in the list on «Pan Camera Down» to activate the item.
Press on a button of the controller, to assign it to the item of the list.

Click in the list on «Pan Camera Left» to activate the item.
Press on a button of the controller, to assign it to the item of the list.

Click in the list on «Pan Camera Right» to activate the item.
Press on a button of the controller, to assign it to the item of the list.

Click in the list on «Pan Camera Up» to activate the item.
Press on a button of the controller, to assign it to the item of the list.

Observe the result in the window «Keys & Buttons»

Assign button: example «Camera Next» and «Camera Previous»

This feature assures a cyclic viewpoint change between: cockpit view, external view, observer view, fly-by view, tower view, sattelite view

Choose a button category: «Global Keys»

Click in the list on «Camera Next» to activate the item.

Press on a button of the controller, to assign it to the item of the list.

Click in the list on «Camera Previous» to activate the item.

Press on a button of the controller, to assign it to the item of the list.

Assign button: example «Vector Map»

The «Vector Map» displays a sattelite view containing for example: navaids (VOR, NDB), airports, and flightplan.
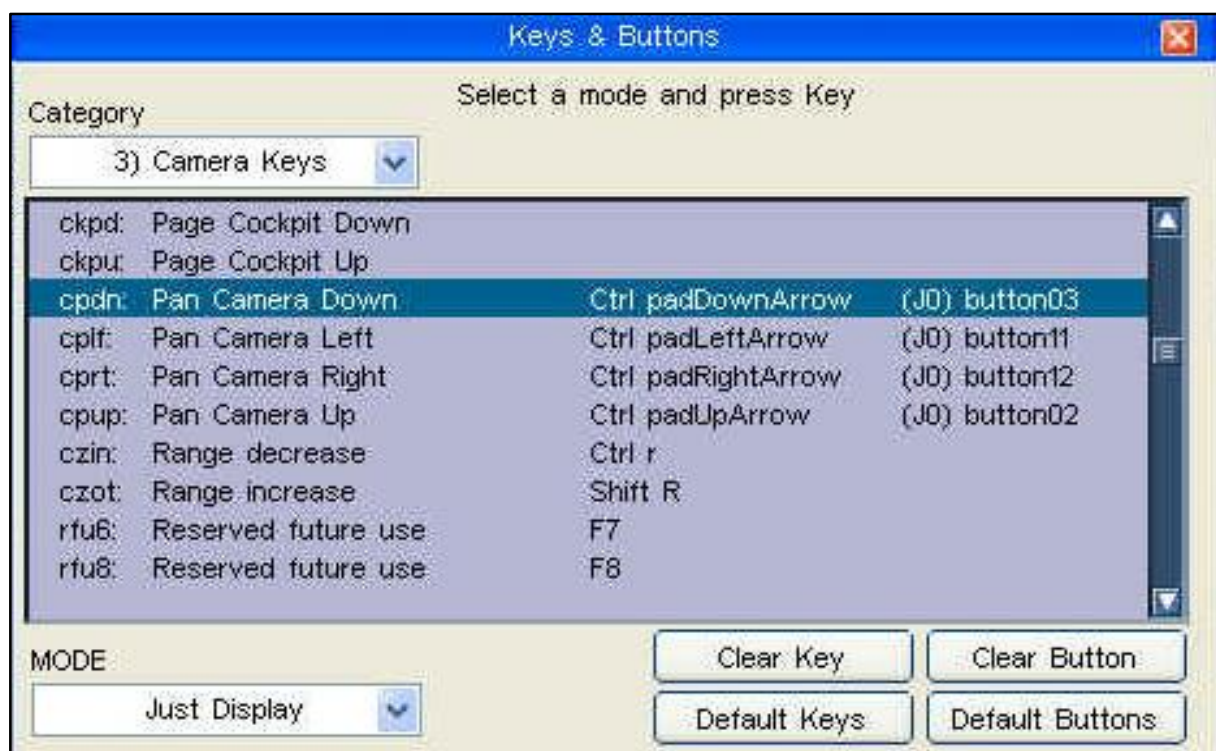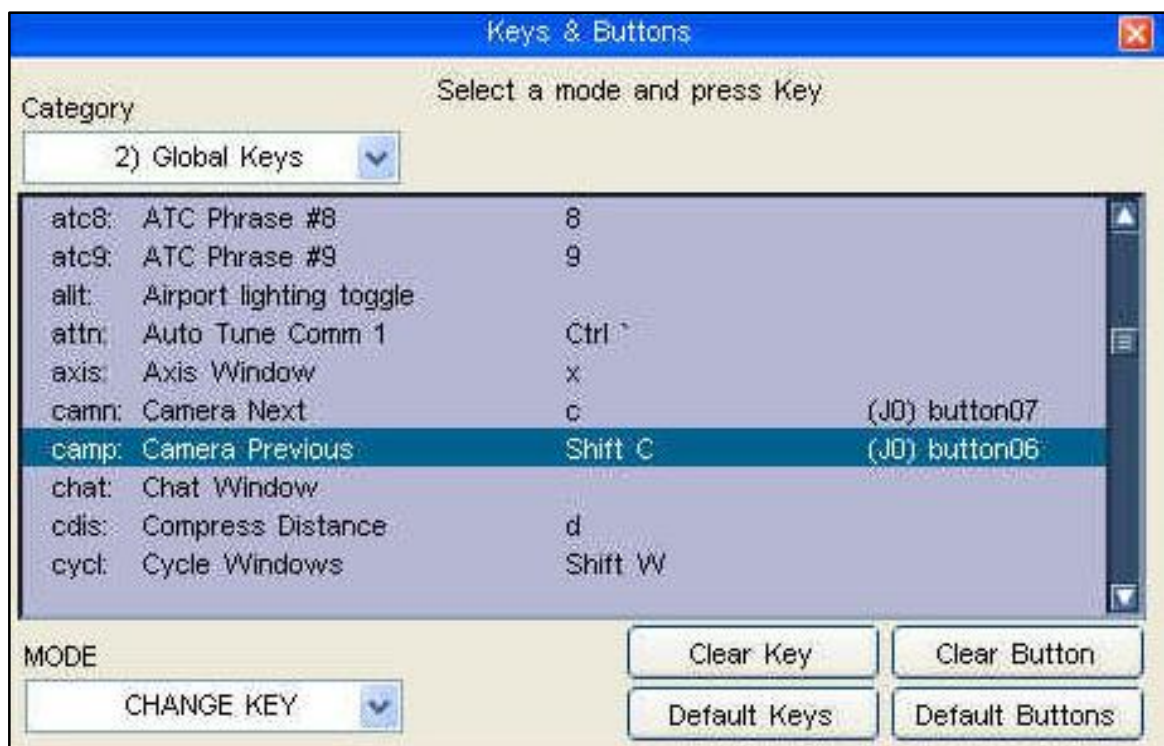
Choose a button category: «Menu Keys»

Click in the list on «Vector Map» to activate the item.

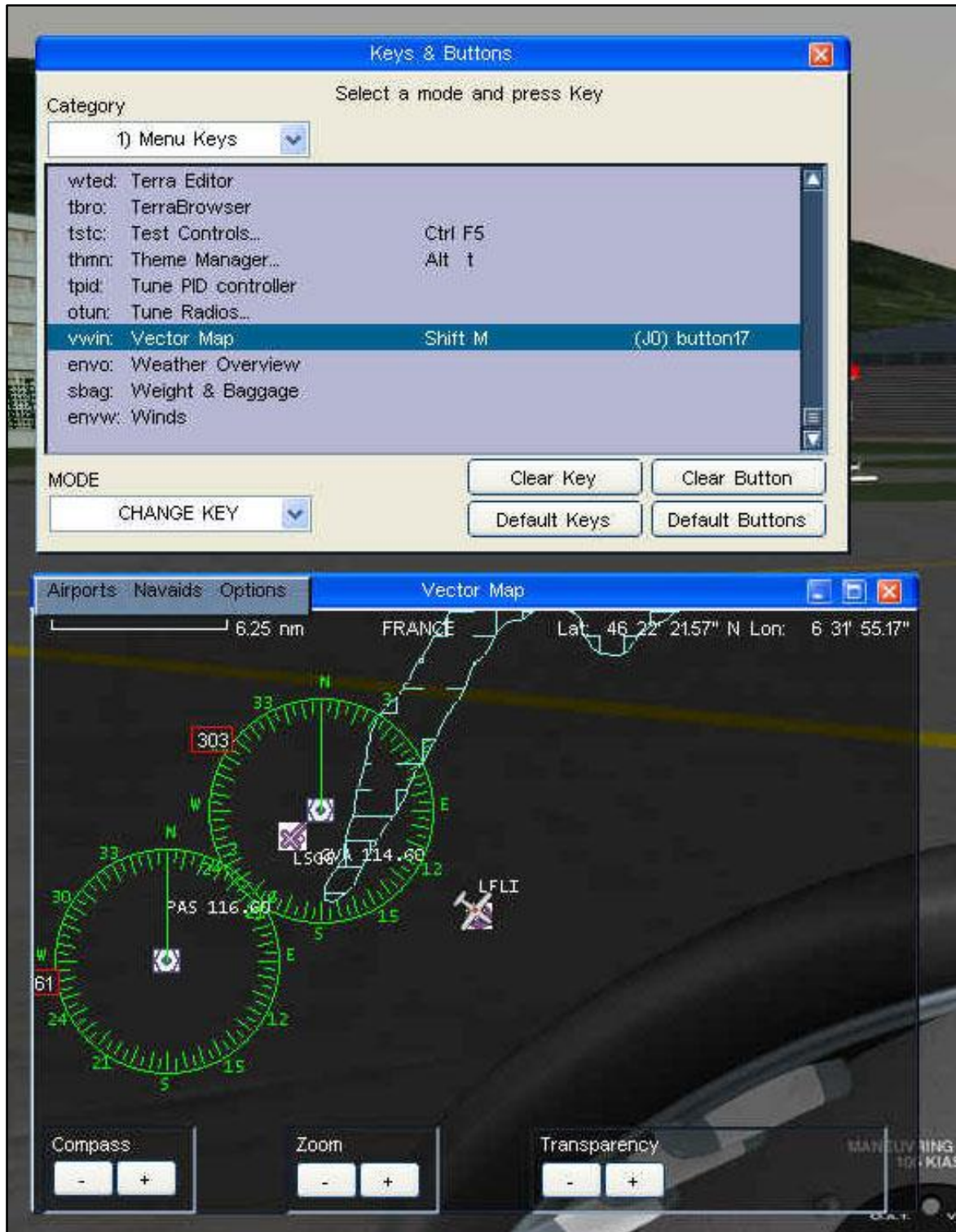Press on a button of the controller, to assign it to the item of the list.

A detailed description of the «Vector Map» is available in

chapter 6 "The integrated Vector Map"

Chapter 4

Principal commands to use Fly! Legacy

Chapter 4: principal commands to use Fly! Legacy

Overview of the principal commands of Fly! Legacy.

SPACEBAR:
Press keyboard spacebar to invoke the Fly! Legacy menubar.

S = mode slew on/off
Slew mode allows to stop the flight and to move, in all directions, the airplane into the scenery. Keyboard controls are as follows:
- A   : Upward vertical movement
- Q   : Downward vertical movement
- Left/right arrow   : Left/right lateral movement
- Up/down arrow   : Forward/backward axial movement
- Home   : Right axial rotation
- PgUp   : Left axial rotation
- End   : Left lateral rotation
- PgDn   : Right lateral rotation

T / **Shift-T** = Time forward/backward, by 30 minutes slot.

Shift-Up/Down Arrow = Upward/Downward instrument panel scrolling.
Also possible while positioning the mouse on the screen (up or down)

Number keypad:
- 9   : Throttle lever (increasing)
- 3   : Throttle lever (reduction)
- 7   : Trim control (upward)
- 1   : Trim control (downward)
- 0   : Rudder control (left)
- .   : Rudder control (right)

B / Shift-B = Brakes on/off.

F / **Shift-F** = Flaps Deployment/Retraction (notch by notch)

C = Cyclical point of view change:
- Instrument panel
- Airplane external view
- Observer view
- Fly-by view
- Control tower view
- Top view

CRTL – Down Arrow   = Down instrument panel view
CTRL – Up Arrow   = Up instrument panel view
CTRL – Left/Right Arrow = 360° view (with 45° increment)

Chapter 5

Quick guide to fly a traffic pattern (circuit)

Chapter 5: quick guide to fly a traffic pattern (circuit)

For the training we will use the default scenery, Annemasse and its area. The circuit is a rectangular path flown by the airplane around the airfield. Generally, all turns in the circuit are made to the left. So, when in downwind leg, you will see the runway on your left.
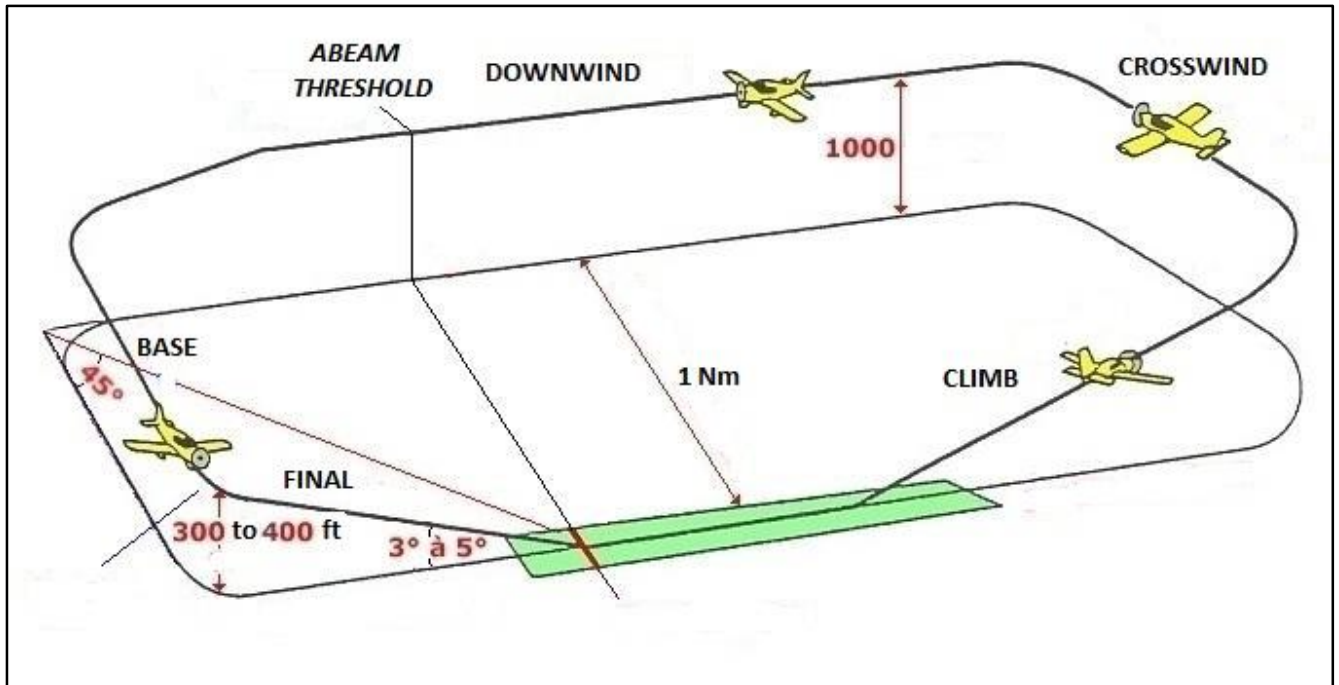
The airplane is located on the tarmac. We will take-off nordwards (rwy 30) into the wind.

It is important to adjust the instrument panel view, to facilitate the flight by the pilot.

Upward / downward cockpit scrolling: position the mouse to the bottom / top of the screen.

Example: instrument panel too high = limited vision during taxi.

Example: instrument panel too low = poor perspective of the vision before landing.

Example: instrument panel correct = optimal perspective to fly a circuit.

Checklist

Before doing the checklist, we must perform an exterior inspection of the airplane.
We have to verify fuselage and wings, control surfaces, oil and fuel level.
Fly! Legacy has an integrated checklist, available via the menu *Vehicle – Checklist ...*

Engine start preparation and engine start.

Change to pedestal cockpit view: **CTRL-Down arrow** (2 times):

Check that, at least, one fuel tank is open.
This Cessna has two fuel tanks, one in each wing.
We can use the right one, the left one, or both fuel tanks.

Verify, below on the pedestal, if the small red lever «FUEL CUT PULL» is completely forward
(=IN), to assure fuel flow towards the engine.

Put the elevator trim to the take-off position by adjusting the trim wheel on the controller or
by mouse clicks on the trim wheel on the screen.

The white mark on the trim wheel need to be aligned with the white triangle.

Change to lower cockpit view: **CTRL-Up arrow** (1 time):

Switch ON the battery "MASTER BAT" (= Right part of red switch)
Switch ON the red beacon light: switch «BCN».
Push the MIXTURE (Red lever) to get fuel flow.
Gently push the THROTTLE (Black lever) slightly forward.
Switch ON the FUEL PUMP switch.

Turn the key «MAGNETOS» clockwise towards the «Start» position and maintain it there for a few seconds untill the engine starts.
Switch ON the alternator "MASTER ALT" (= Left part of red switch)

Switch ON the avionics: click on the white switch «AVIONICS».

Switch ON the KLN89 GPS: right-click on the GPS button «PUSH ON»
        After a warm-up time and self test: confirm by clicking 4 times on «ENTER»
Switch ON the radio KX155: right-click on the button «COM».
Switch ON the transponder KT76: one right-click on the selector XPDR: «STB»

Switch ON the lights: «TAXI» and «NAV»

Deploy 10° flaps: press the flaps controller button once (or click on the white handle «WING FLAPS» or press the keyboard "**F**" key)

«Taxi» to the runway.

Change to main cockpit view: **CTRL-UP arrow** (1 time):

Notice the altitude indicating 1617 feet at airport Annemasse.
This is adjusted for **QNH** (Quest Nautical Height) referenced to sea level.
According the actual air pressure, the altimeter might indicate a wrong ground altitude.
To correct this, apply L/R (increase / decrease) mouse click on the barometric button at the lower left of the altitude indicator.

To know the ground altitude we have 3 options:

      Option 1: consult the aeronautic charts
      Option 2: consult the GPS KLN89 airport screen

      Option 3: activate the menu-bar (press spacebar), Windows –> Vector windows.
          The Vector Map represents the sattelite view of the airports and navaids needed during flight: VOR-DME, NDB.
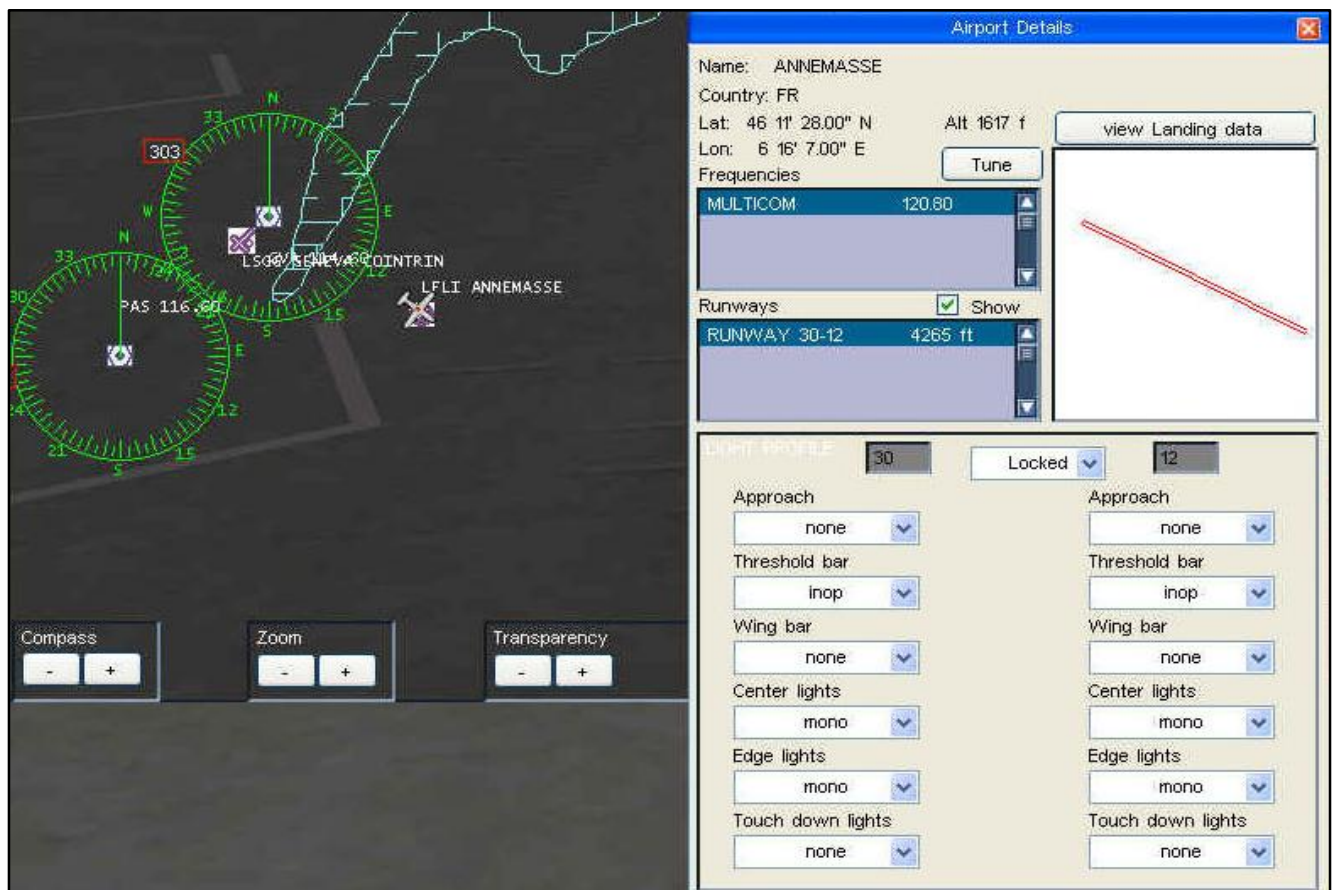
Move the mouse over LFLI (= indicator for Annemasse).
When this indicator becomes bright bue, apply mouse left-click.
A window appears to display the platform détail, containing the altitude 1617 feet.

To verify the taxiway layout towards the take-off runway:
Mouse right-click on the icon «LFLI Annemasse» to open a selection menu.

Select «VIEW RUNWAYS» to visualize the taxiways towards the take-off runway (30).

To quit the plan: right-click on the airplane icon -> click «CLOSE VIEW».

We need to align the gyro-compas to the magnetic-compas (located above the instrument panel)

Mouse left-click on the left button of the gyro instrument to decrease the value, mouse right-click to increase.

Taxi the aircraft towards the holding point of runway (30) and stop the plane by applying brakes. (Rudder brake pedals or press key "**B**" on the keyboard).

Before take-off.

Activate the transponder: enter the code 7000 for VFR flight in Europe (1200 for the US) by mouse click on the appropriate buttons 0-7. Put the mode selector on «ALT».

Switch ON the landig lights: «LIGHTS LAND»

Align the Cessna to the runway 30 axe, and stop the plane.

Ready for departure

Departure and climb.
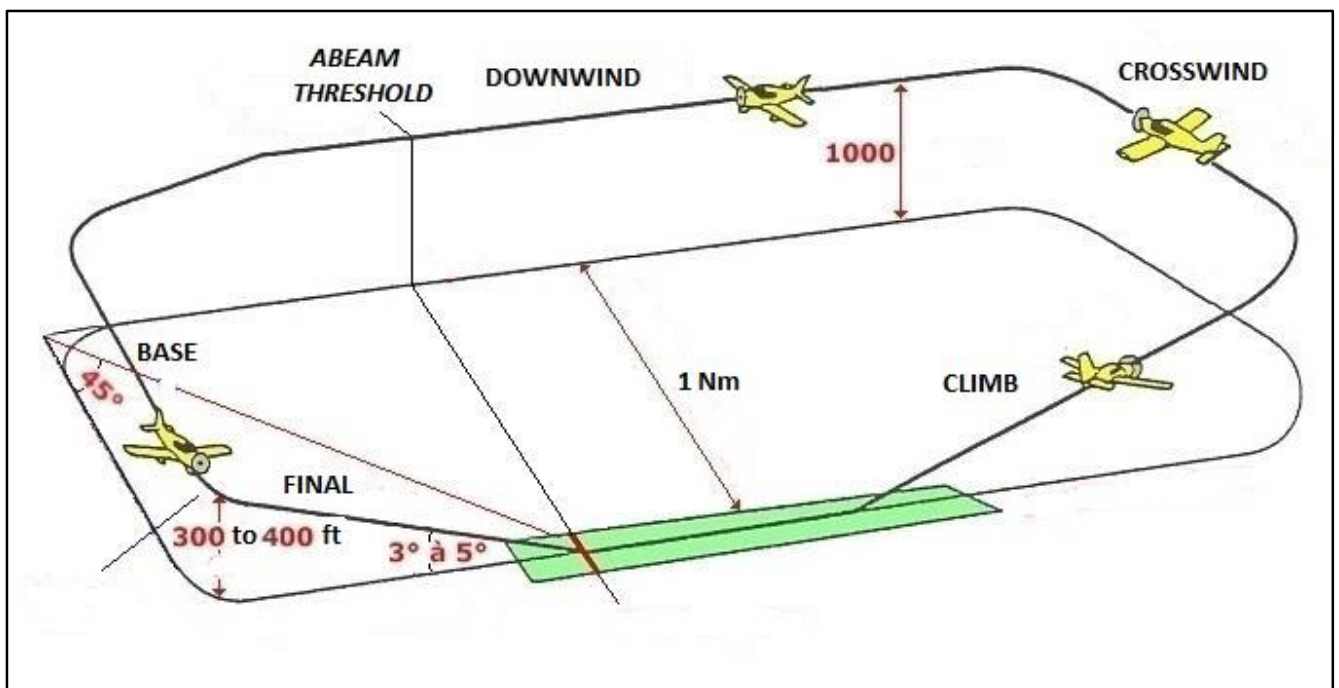
Apply FULL THROTTLE by joystick, or by keyboard numeric key "**9**".

The aircraft starts rolling and gains speed.
Maintain the aircraft aligned to the runway axe by applying rudder pedals, or by keyboard numeric keys "**0**" and "**.**"
The Cessna tends to turn to the left, mainly due to the torque created by the propellor.

When the speed on the airspeed indicator reaches 80 knots, *the rotation speed*, slowly pull the yoke until the airplane noses up and gains height.

Retract the flaps: controller button (or click on the white handle «WING FLAPS» or press keyboard **Shift-F**).
The aircraft is now in *clean configuration*.

Attention:
- Keep Cessna speed IAS = 80 kts, by adjusting the pitch of the yoke:
  Decrease the pitch = increase the IAS speed.
  Increase the pitch = decrease the IAS speed.
- Keep 300°. The Cessna tends to turn to the left, mainly due to the torque created by the propellor.

Continue the climb till 2600 feet (=1000 feet above ground level). Remain to the runway axe.
When reaching 2600 feet, transition to horizontal flight.
  Reduce throttle.
  (Approximative 2100 rpm)

Apply ailerons by turning the yoke to turn towards the left: course 210° (= 300° – 90°).

Crosswind leg.
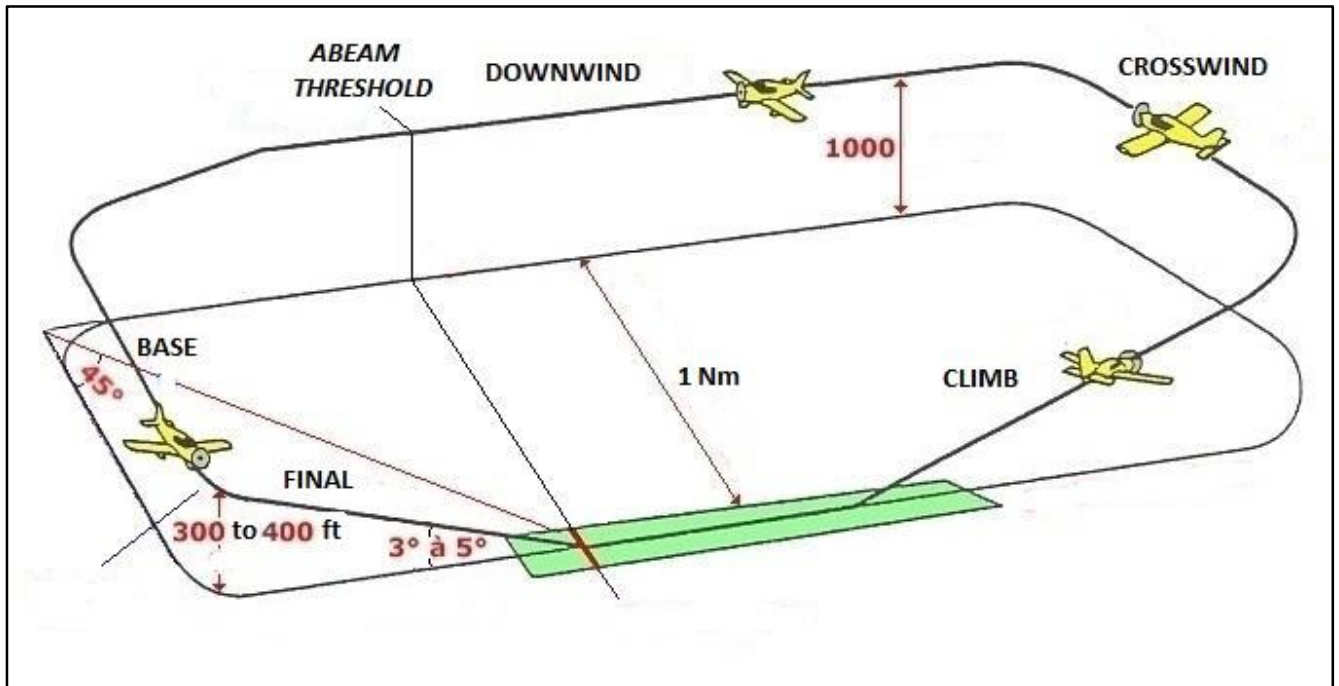
We maintain the 210° course.

Maintain an altitude of 2600 feet (=1000 feet above ground level) by adjusting the trottle.
If required, remove the perceived yoke pressure by adjusting the trim wheel on the
controller (or by mouse clicks on the trim wheel on the screen).

Continue flight during one minute and turn towards 120° (=210° - 90°) which is referred as
the downwind leg.

Downwind leg.

We keep the 120° course.

You retrace you steps, flying parallel to the runway visible on your left, at left-hand.

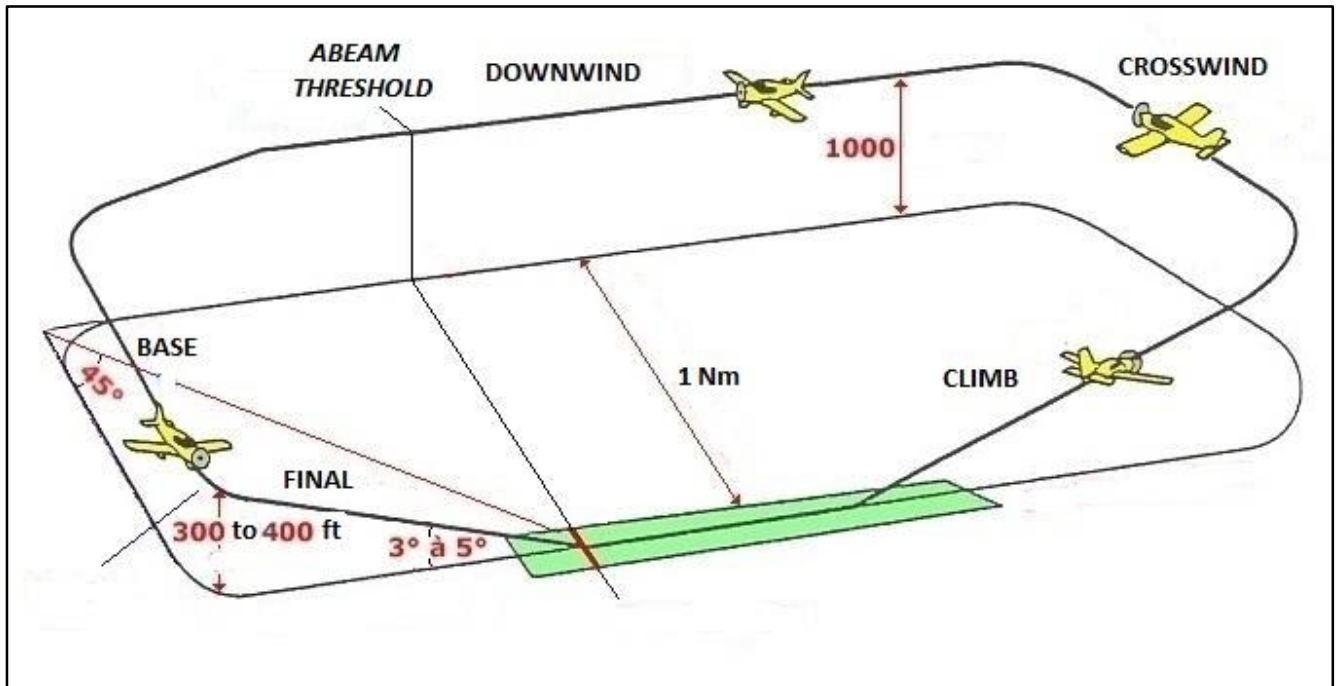Maintain an altitude of 2600 feet (=1000 feet above ground level) by adjusting the trottle.
   If required, remove the perceived yoke pressure by adjusting the trim wheel on the
   controller (or by mouse clicks on the trim wheel on the screen).

The 2200 rpm, is resulting in a speed of approximative 100 knots.

We already prepare for landing.

When the Cessna is flying abeam the *runway threshold*.

- Reduce throttle towards 1900tr/mn.
- Deploy 10° Flaps
  (controller button, or click on the white handle «WING FLAPS», or press keyboard **F**)

The indicated airspeed is now decreasing towards 80 knots.
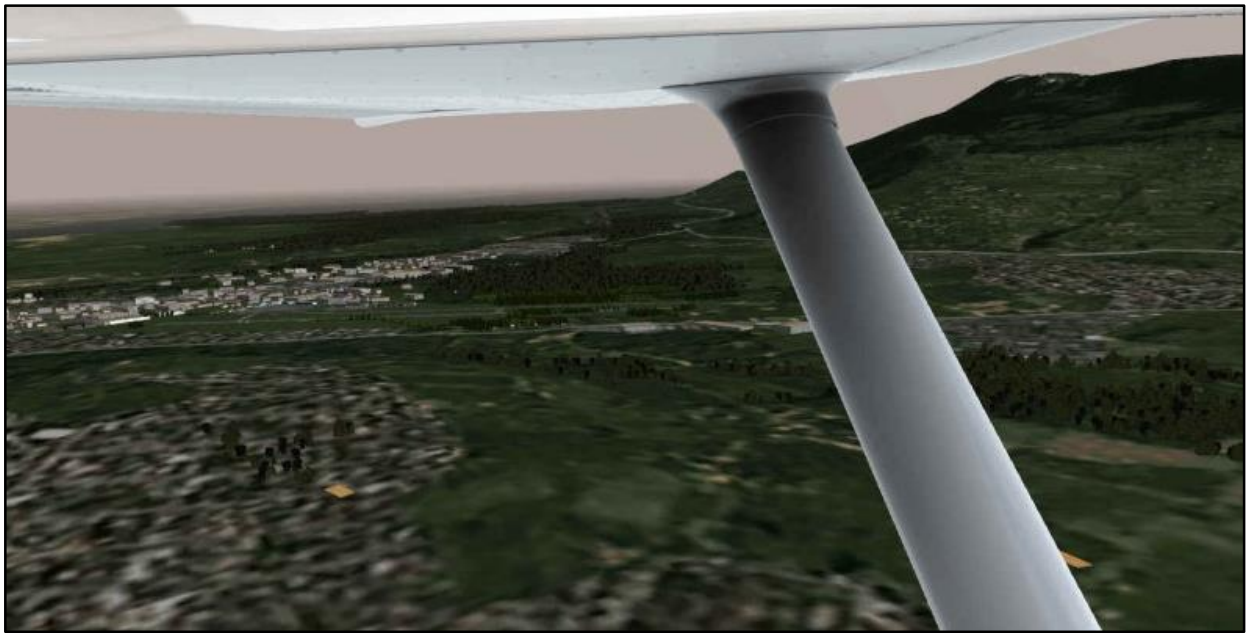
We keep the traffic pattern altitude of 2600 feet ! (adjust throttle and elevator trim)
We maintain the 120° course.

Continue during 1 Nm (nautical mile) corresponding to 45 secondes at 80 knots.
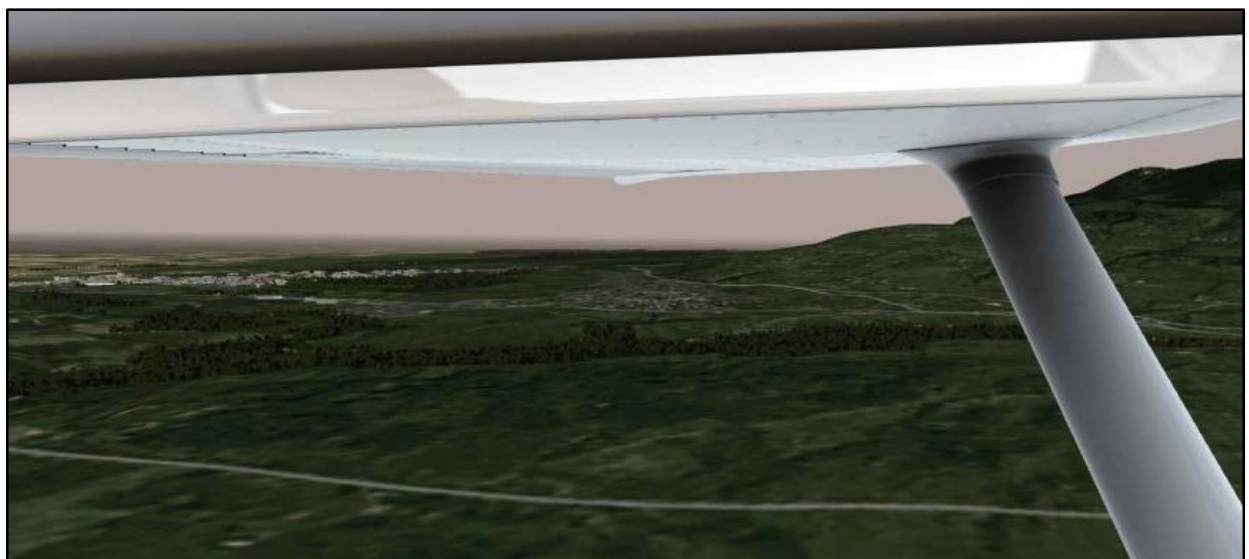
Turn left towards a course of 30° (=120° - 90°) referred as the *base leg*.

Base leg.

- Reduce throttle towards 1700tr/mn.
- Deploy a second catch of flaps : 20° Flaps
  (controller button, or click on the white handle «WING FLAPS», or press keyboard **F**)

The indicated airspeed is now decreasing towards 70 knots.

The Cessna is now descending at a rate of about 500 feet per minute.

Maintain the 30° course of the base leg.
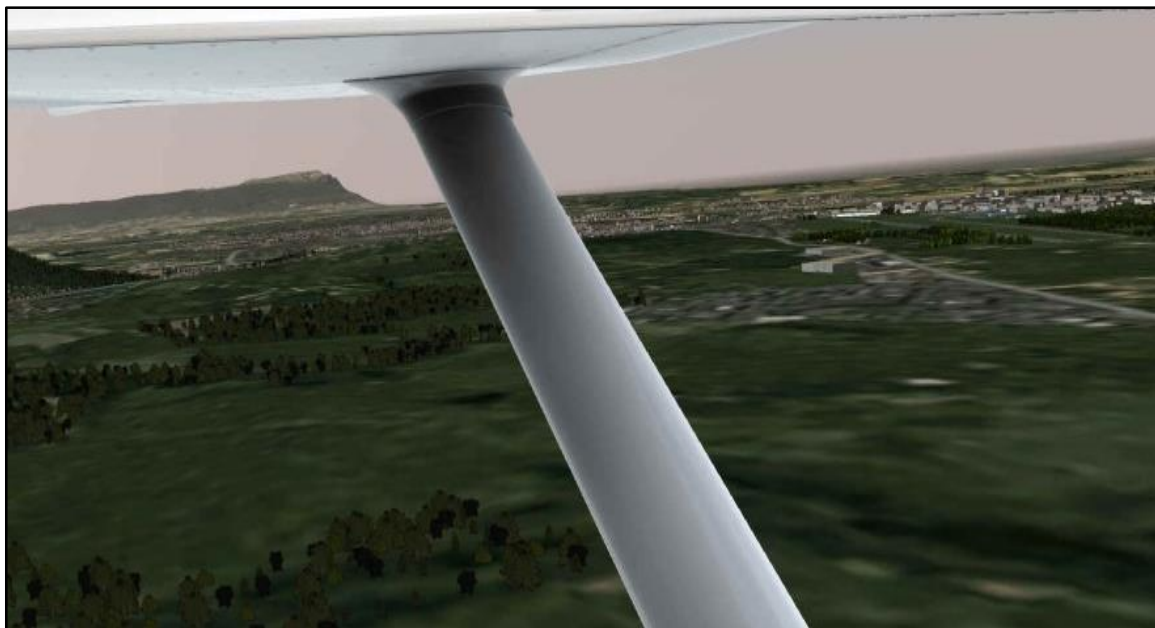
Monitor the position of the runway referred to the aircraft.
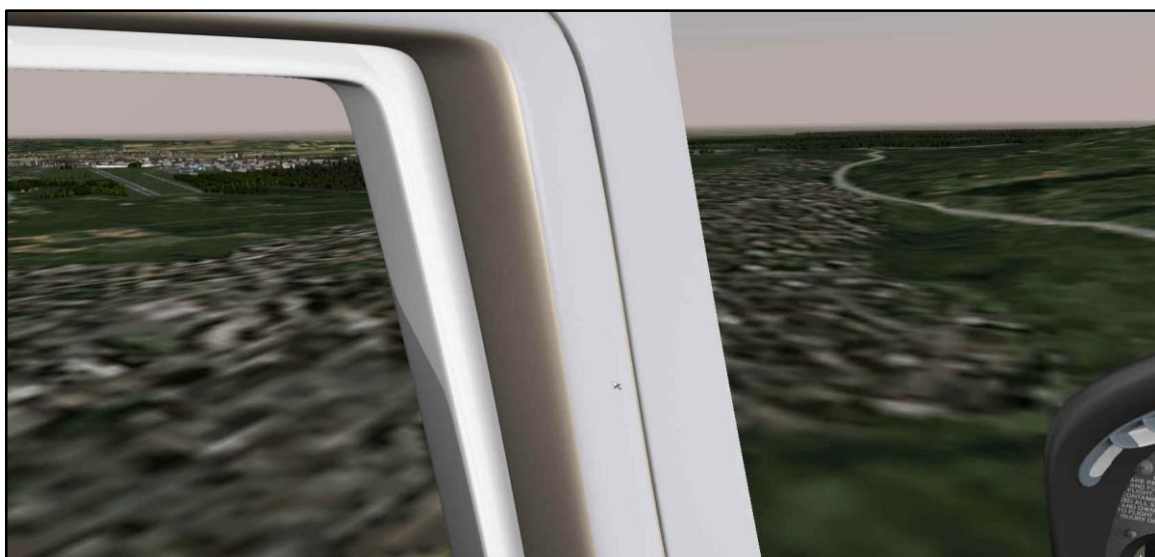
Turn 90° to the left, in order to obtain a course of 300° (= 30° - 90° + 360°) aligned with the axe of the runway.

Attention:
- Avoid an «overshoot» which occurs if exceeding the runway axe.
- Aim to descent at towards an altitude of 300 feet AGL (= Above Ground Level)

Final leg.
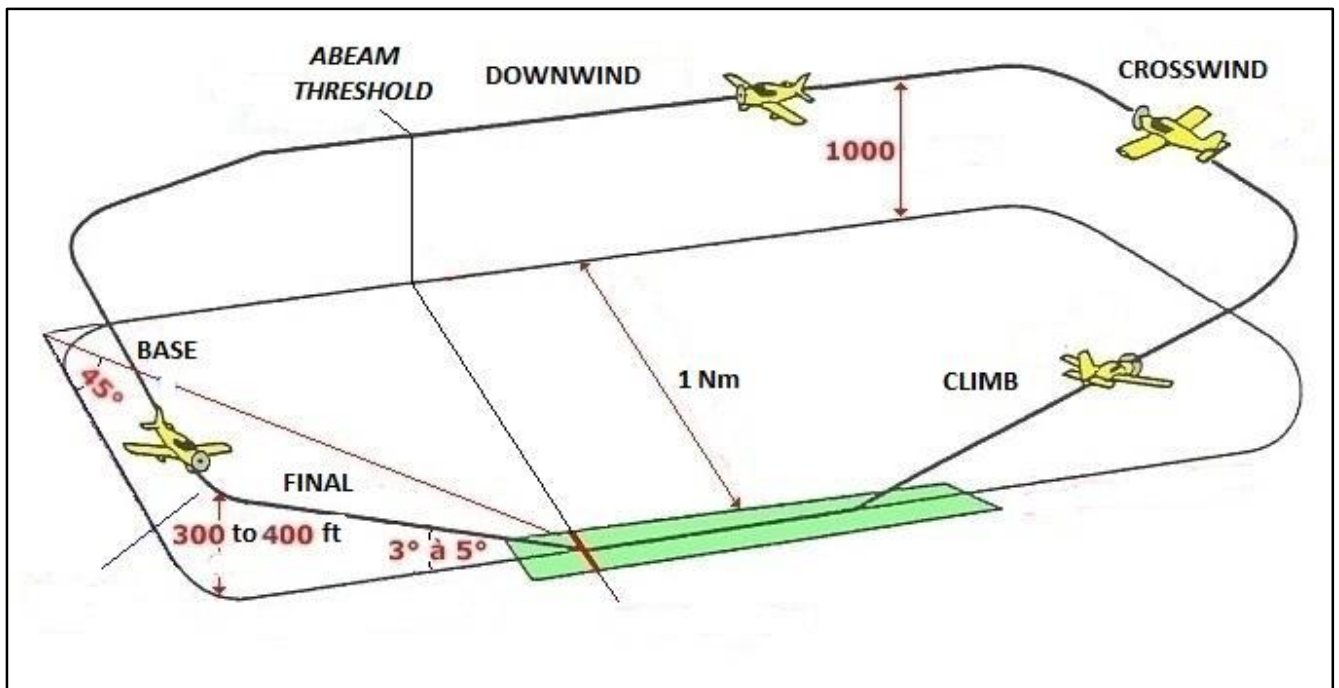
Start the descent towards the runway threshold at a rate of descent of 500 Feet Per Minute (FPM). If needed, adjust the throttle to assure the appropriate lift.

Make sure the longitudinal axis of the airplane is aligned with the runway centerline.
You fly at low speed, avoid sudden brusk manoevers.

As a precaution, start the fuel pump: selector «FUEL PUMP»

You have to arrive above the runway just after the painted figures.

Ideally aim for the markers as showed on the picture below.
During final descent, those markers need to be in a fixed position on your cockpit screen.
If they move down or up, correct accordingly by applying more or less throttle.

Reduce the throttle completely and slightly nose-up the plane to do a perfect flare.

During flare: fix your pilots view on a distant point in the axe of the opposite runway end.

When main wheels touch the runway, push the joystick forward in order that the nose wheel touches the runway, and begin to brake by fits and starts.

Close the throttle.

Congrats, you landed.

Vacate the runway.

- o Retract flaps (0°): controller button, or click on the white handle «WING FLAPS», or press keyboard **Shift-F**)
- Transponder: mode selector «ON»
- Landing lights OFF.
- Shut-off the fuel pump: selector «FUEL PUMP» OFF.

Taxi to the hangar.

Aircraft at the ramp.

- Shutt-off the transponder KT76: selector «XPDR» OFF.
- Pull the «MIXTURE» (red lever) to shut-off the engine.
- Shutt-off the magnetos:
  turn the «MAGNETOS» key-switch counterclockwise (clic gauche) till the position OFF.
- Shutt-off the avionics: click on the white switch «AVIONICS».
- Shutt-off the lights: «TAXI», «NAV», «BCN» (beacon).
- Shutt-off the "BAT" battery and "ALT" alternator: red switch.

Do this exercise again and again until you completely master it.

It allows to become familiar with principles of flight, and it consists of all the phases of a visual flight.

Chapter 6

The integrated Vector Map

Chapter 6: the integrated Vector Map

Acces to the Vector Map: menu «Windows» -> «Vector window»
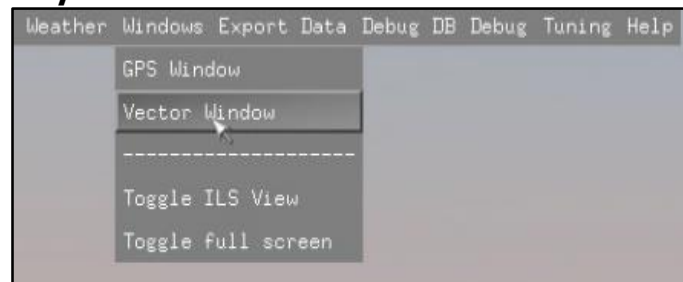
The Vector Map appears: its a useful tool which supports the flightplan preparation and the navigation during the flight.

The buttons at the bottom of the Vector Map.

Button «Transparency +/−»: to adjust the transparency of the Vector Map.

Button « ZOOM +/-»: to zoom IN / OUT the map.
Button « COMPASS +/-»: to vary the diameter of the VOR compas rose.
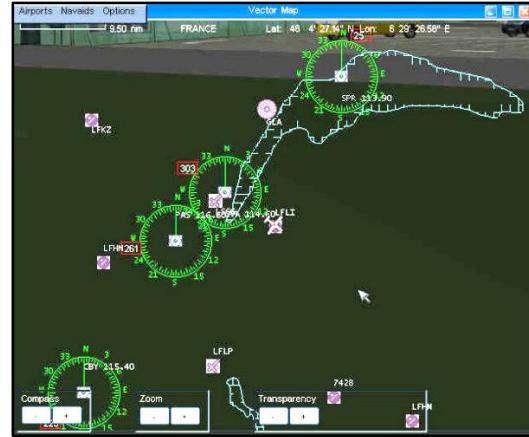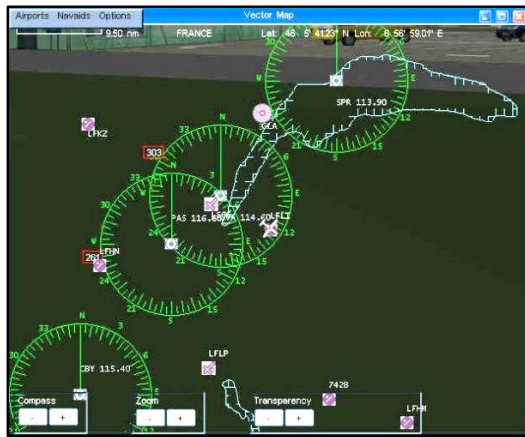
The menu at the top of the Vector Map.

Menu «*Airports*»
- Show Airports: activate / de-activate the airport icon on the map.
- Show Names: activate / de-activate the airport name on the map.
- Show ID's: activate / de-activate the airport ID (Identifier) on the map.

Menu «*Navaids*»
- Show NDB: activate / de-activate the NDB (Non Directional Beacon) icon.
- Show NDB Names: activate / de-activate the NDB name on the map.
- Show NDB ID's: activate / de-activate the NDB ID (Identifier) on the map.
- Show VOR: activate / de-activate the VOR (VHF Oriented Radio) icon.
- Show VOR Names: activate / de-activate the VOR name on the map.
- Show VOR ID's: activate / de-activate the VOR ID (Identifier) on the map.
- Show VOR Frequencies: activate / de-activate the VOR frequency on the map.
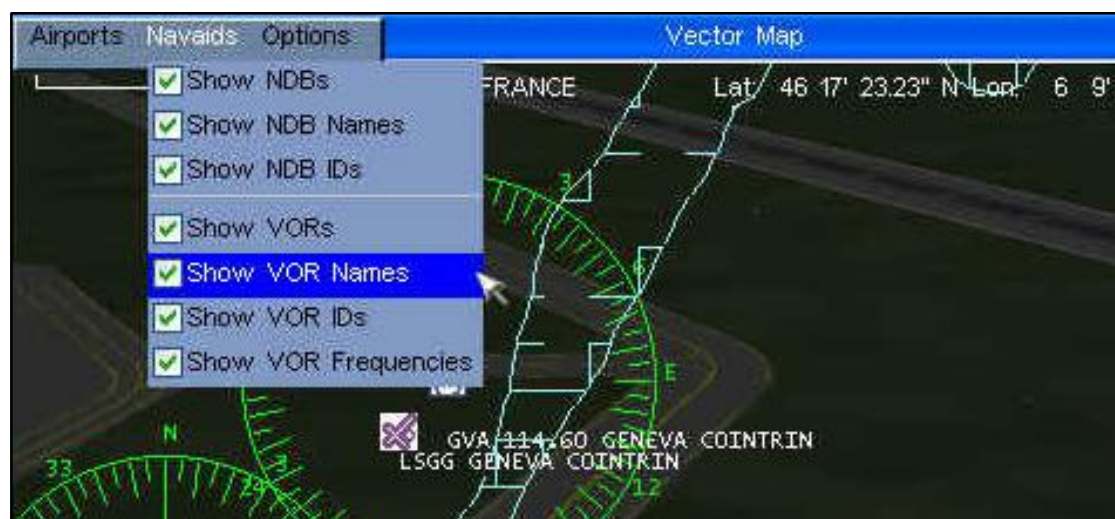
Menu «*Options*»
- Show Labels: activate / de-activate the labels.
- Coast line: activate / de-activate the coast lines (between sea and land)
- ILS Director: activate/de-activate the director line representing the ILS localiser.
- Compass Rose: activate / de-activate the VOR compas rose.
- Fade Compass Rose: change the luminance of the VOR compas rose.

Vector Map: acces to the NAVAID (VOR / NDB) details.

- Move the mouse over the VOR (or NDB) icon on the map.
- Mouse left-click: a window containing the navaid details appears.

- Mouse click on the button «TUNE», and the VOR (or NDB) frequency is immediately transferred into the airplane avionics (NAV) standby frequency.

Vector Map: acces to documents (For example: approach charts, …)

Move the mouse over the airport icon.
- Mouse left-click: a selection window appears.

- Select «OPEN DOCUMENTs»: a window containing the document names appears.

- Select the desired document: the document appears in the Vector Map.

Attention: the documents need to be available in the «Documents» sub-directory of FlyLegacy. The document name needs to start with the 4 characters of the airport ID code (for example: LFLB_VAC.jpg). The required document format: JPEG, BMP…

Vector Map: acces to airport details.

- Move the mouse over the airport icon.
- Mouse right-click: a window containing info and options appears.
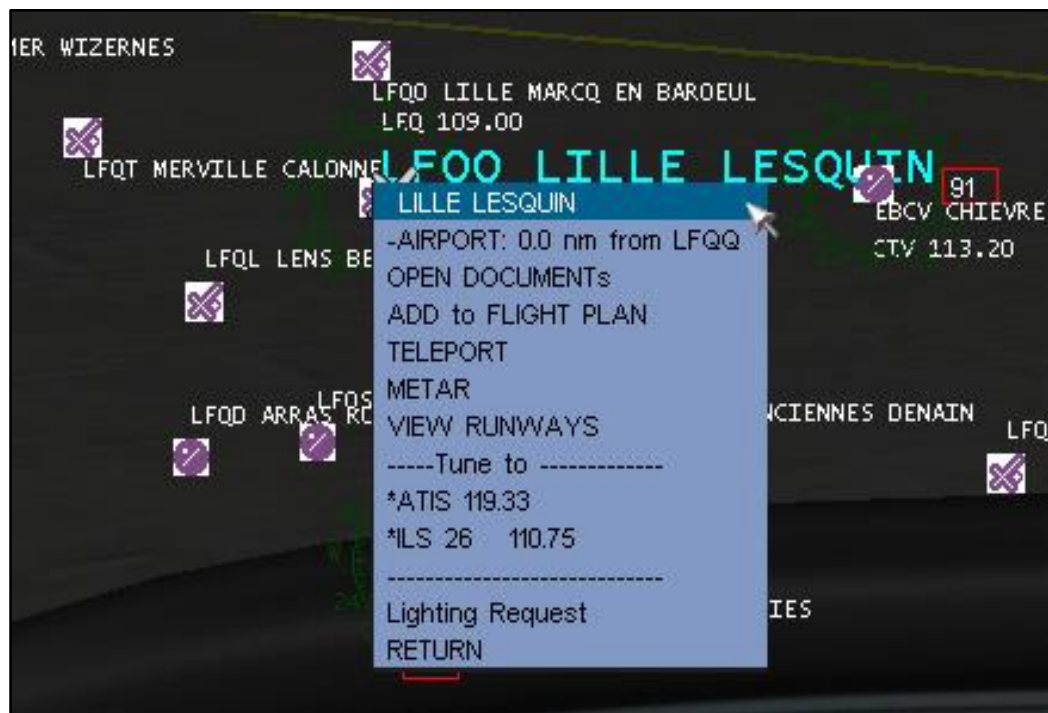
- o The airport name: for example «LILLE LESQUIN».
- o The distance between the aircraft and the airport: nautic miles (Nm)

- o «OPEN DOCUMENTS»: show documents in the Vector Map.
  Already explained in this chapter.

- o «TELEPORT»: mouse click and the airplane can be teleported to an airport.
- o «METAR»: mouse click and the airport METAR is shown.

- o «VIEW RUNWAYS»: shows the lay-out of runways and their taxiways .
  We are able to choose a take-off runway: by right-click on the aircraft icon.

To quit the lay-out: right-click on the aircraft icon -> then click «CLOSE VIEW».

   o «Tune to»: display the airport frequencies:
     ▪ ATIS 119.33: the ATIS frequency.
     ▪ ILS 26 110.75:   the ILS frequency.
   o «Lighting Request»: mouse click to activate the airport runway lights.
   o «RETURN»: return to the Vector Map.

- From the Vector Map, locate the mouse over the airport icon.
  Mouse Left- click: a window containing airport details appears.

   o Name, country, latitude, longitude, airport altitude.
   o The airport frequencies (TOWER, GROUND, ATIS, APPROACH, ILS, …)
     Mouse click on the button «Tune»: the selected frequency is directly
     transferred to the avionics (COM ou NAV).
   o «Runways»: - runway name with the runway lenght in feet.
         - layout of the runways.
   o «LIGHT PROFILE»: selections regarding the light profile of a choosen
   runway.

Vector Map: acces to the flightplan.

The Vector Map allows us to generate and visualise a flightplan.
The method to generate a flightplan is explained in detail in chapter 7: «The integrated Flightplanner».

The example below shows an already generated flightplan.
This flightplan is shown in the window «FLIGHT PLAN LOG» but also in the GPS.

The flightplan represented in the Vector Map contains several segments, defined by their related waypoints (orange points)

- Mouse click anywhere in the Vector Map: will add a waypoint to the flightplan.
- Sustained mouse click on an existing user waypoint in the Vector Map: to relocate the waypoint in the map (waypoint will follow the mouse movement). Release the mouse-click at the desired spot

The «FLIGHT PLAN LOG» and the flightplan in the GPS are updated in real time.

Chapter 7

The integrated Flightplanner

Chapter 7: the integrated flightplanner

Teleport the aircraft to a choosen airport (or navaid):

Menu «Flight Planner» -> «Directory»
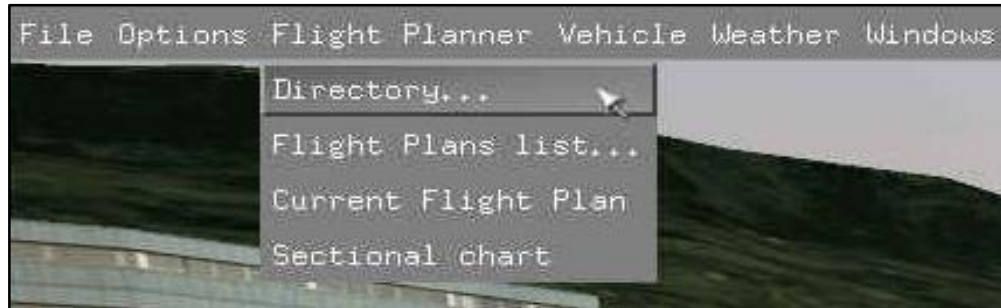
A window «Directory» appears.
Select «Waypoint Type»: for example «AIRPORT»
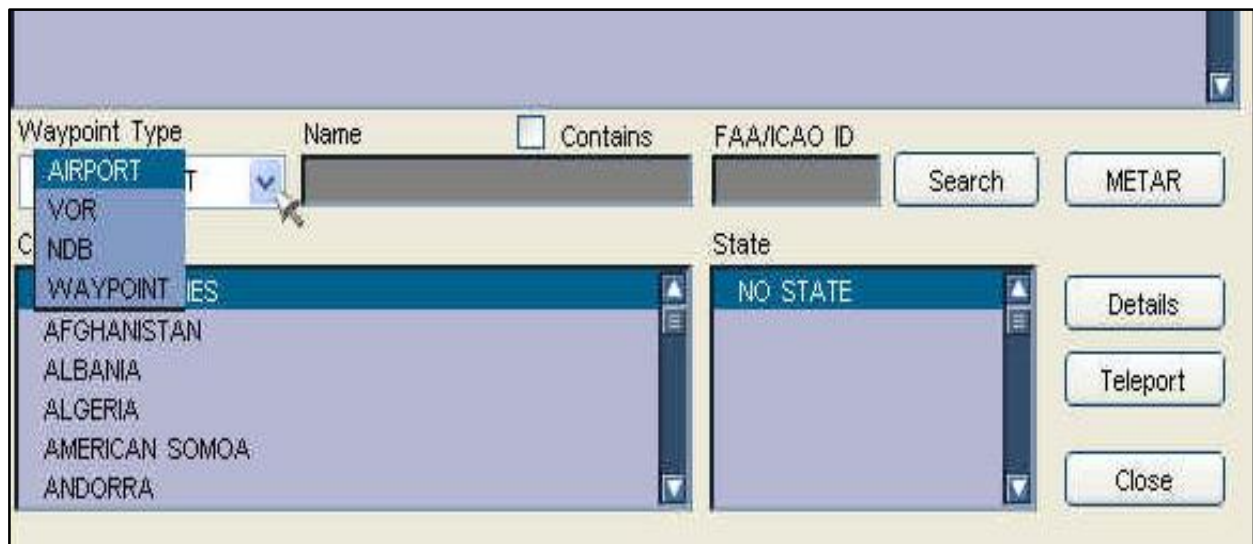
Entrer the airport name: for example CHAMBERY
Attention!: mark the option «Contains» !
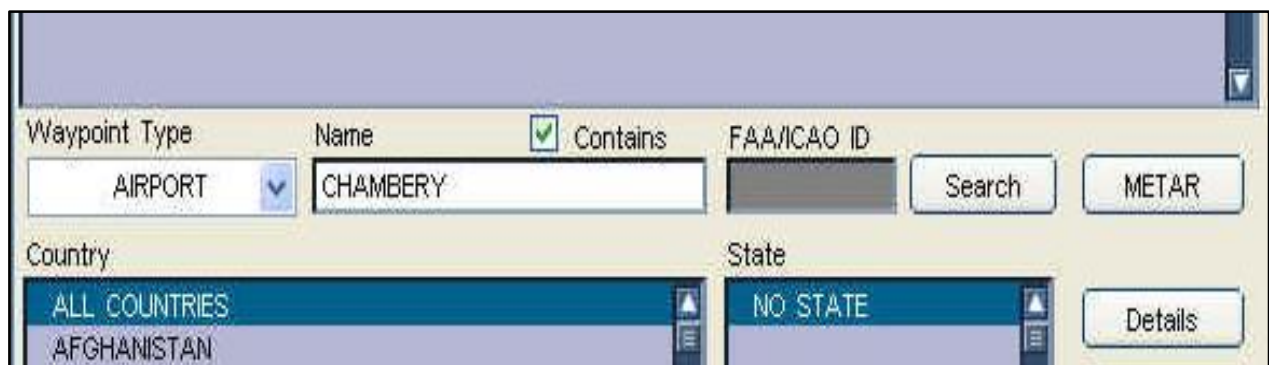
Confirm by click on «Search»: the airport appears in the list.
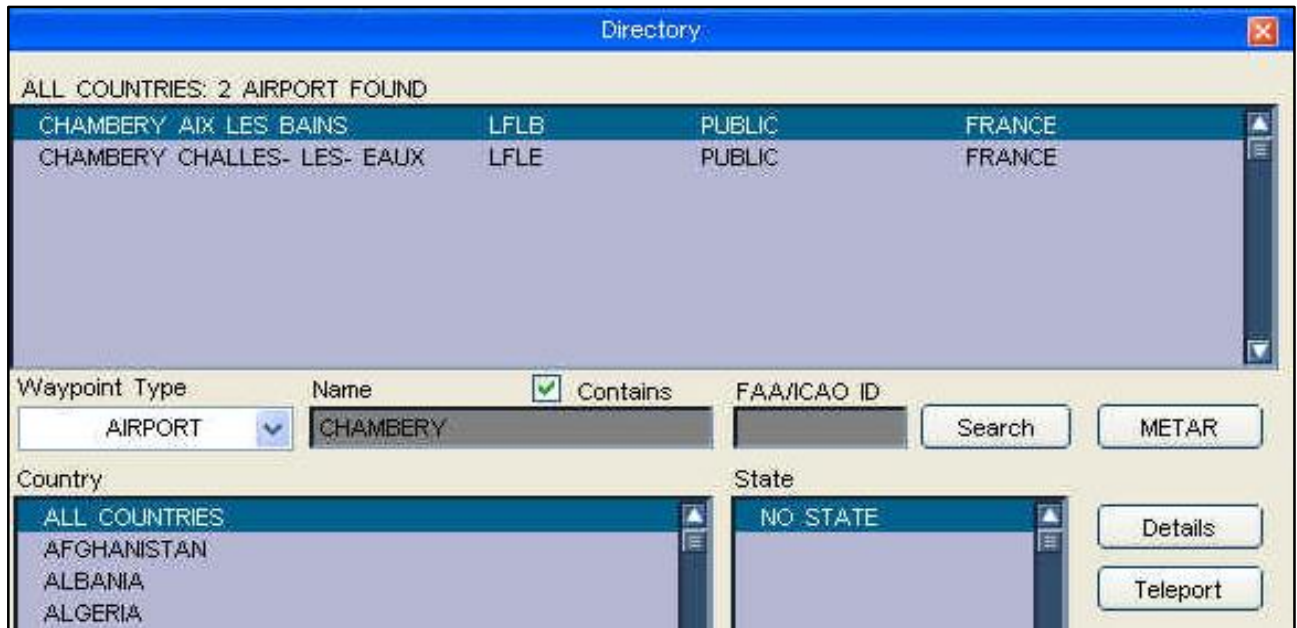
Choose an airport from the list: for example CHAMBERY AIX LES BAINS
Click on the button «Teleport» and the aircraft is teleported towards Chambéry.
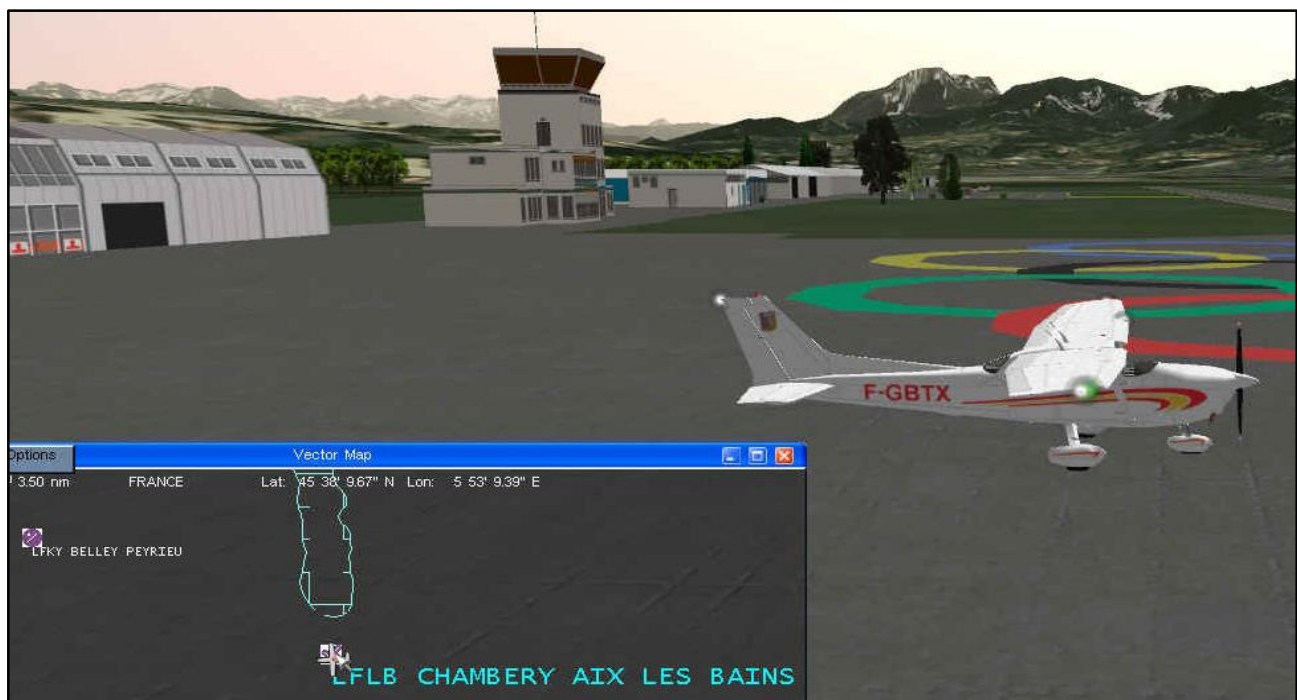
Load an existing flightplan.

Menu «Flight Planner» -> «Flight Plans list …»
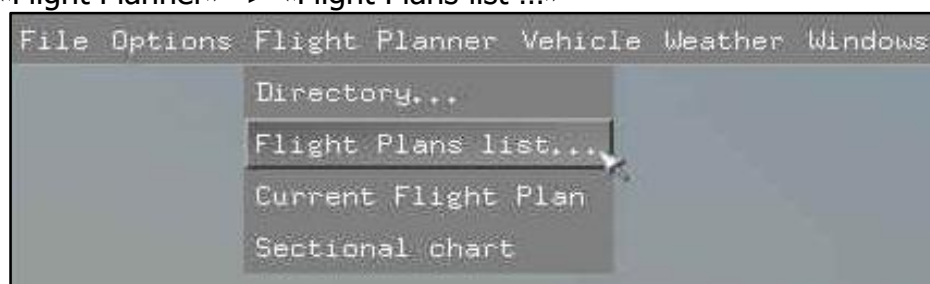
A window «FLIGHT PLAN MANAGER» appears.
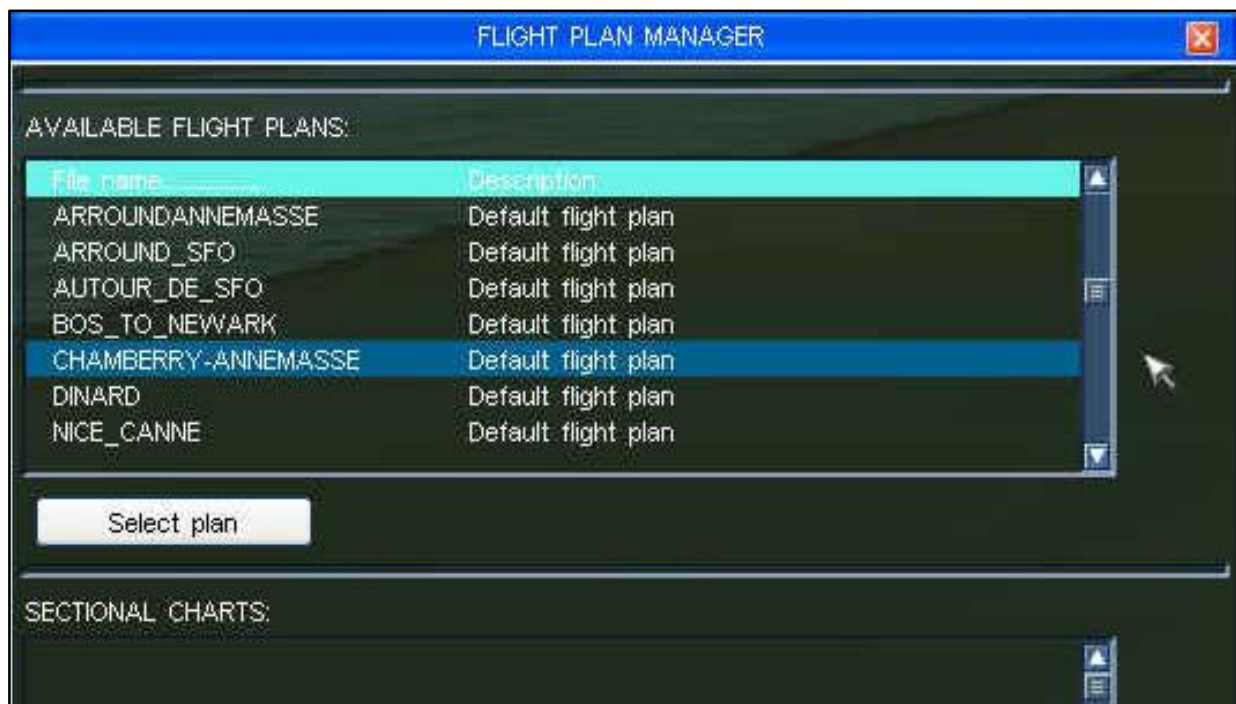
Choose from the list «AVAILABLE FLIGHT PLANS» a flightplan to be loaded: for example «Chambérry-Annemasse»

Click «Select plan»: a window «FLIGHT PLAN LOG» appears.
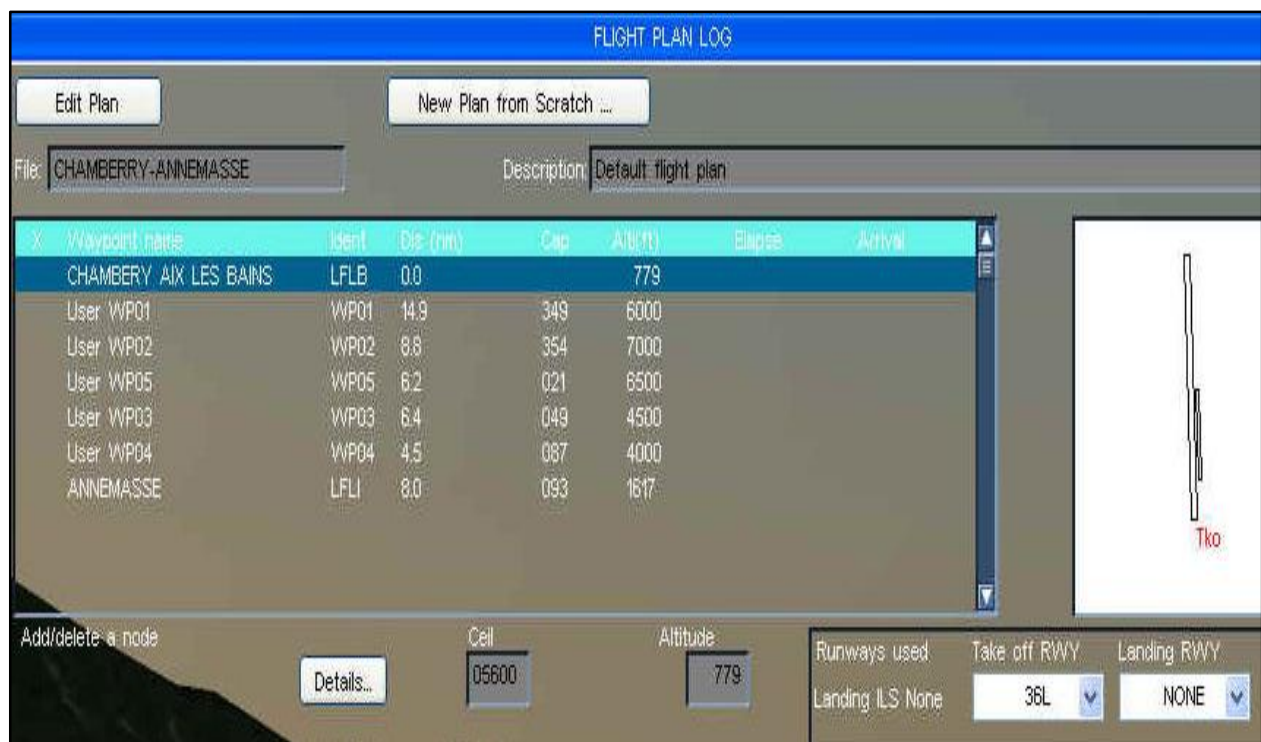
The loaded flightplan is also displayed in the Vector Map.

Now, we will edit the flightplan.

Click on the button «Edit Plan» in order to edit the flightplan.
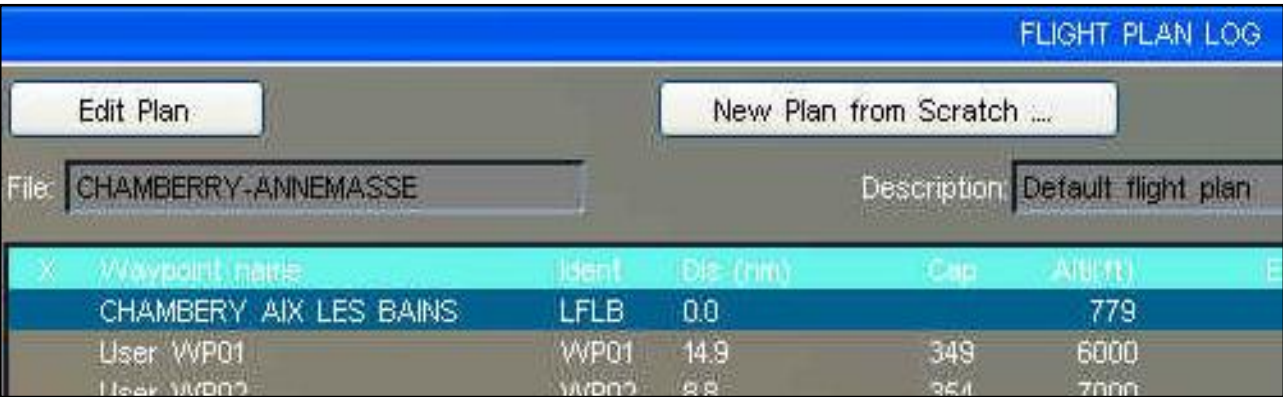
The «FLIGHT PLAN LOG» is now changed to edit mode.
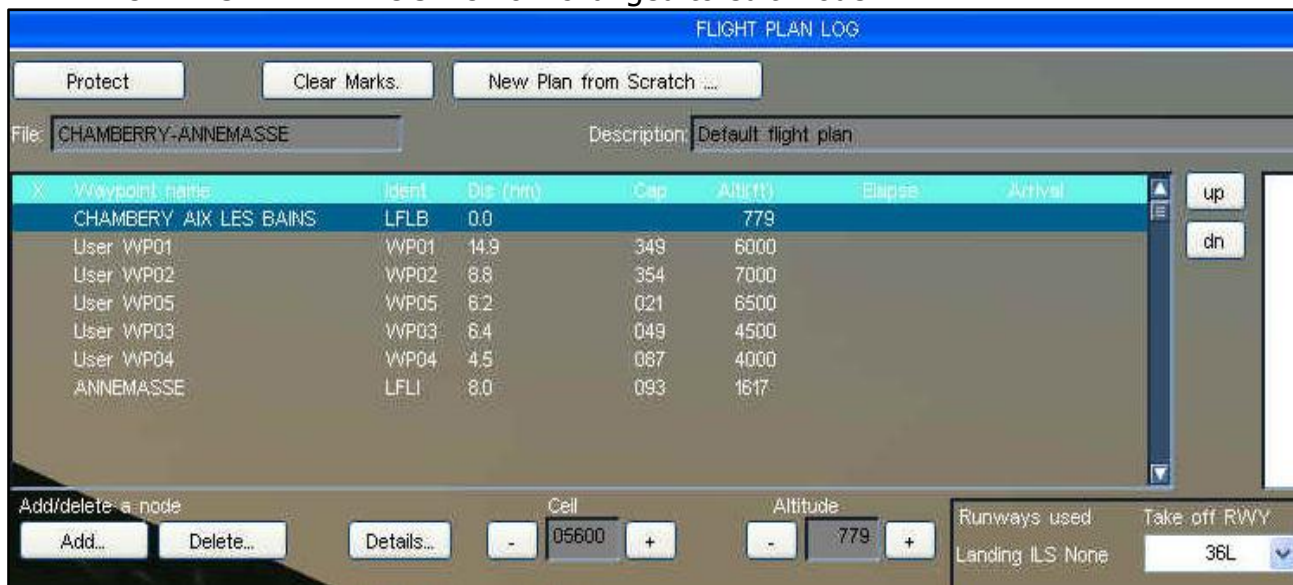
Choose a waypoint from the list: for example «CHAMBERY AIX LES BAINS»
Click on the button «Details»: a window with the airport details appears.
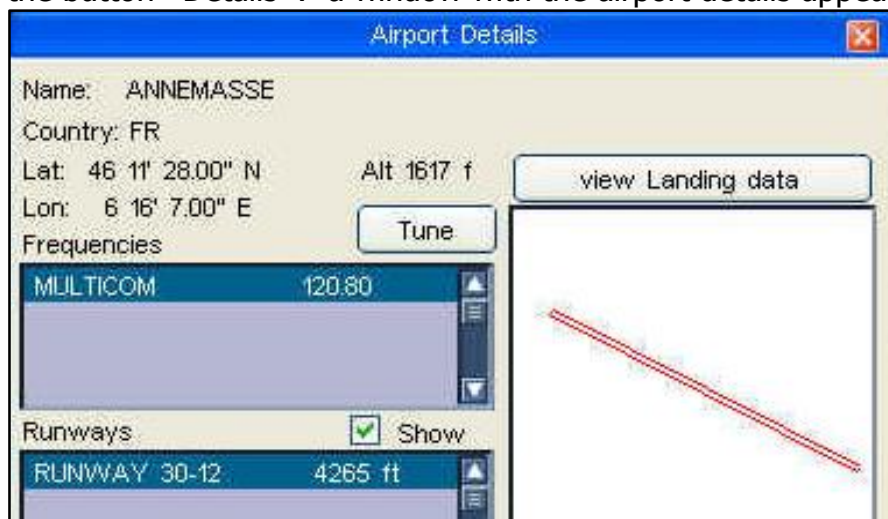
Add a waypoint to the flightplan (for example the VOR of Chambéry)
Choose a position in the flightplan by clicking on the buttons «up» or «dn».
Click on the button «Add ...» and a window «Directory» appears.
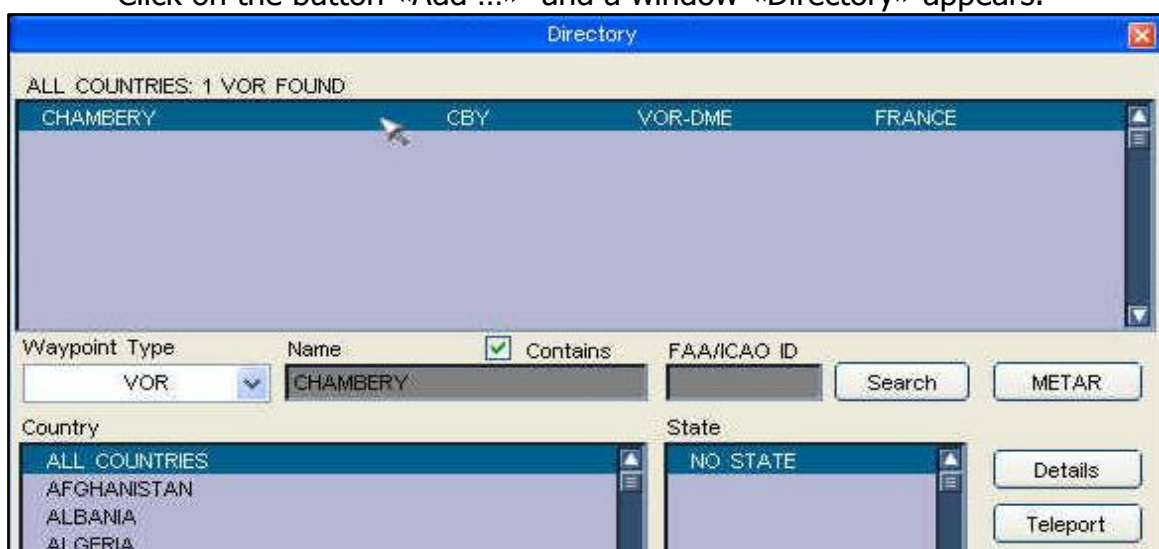
Click «Waypoint Type»: select VOR.
Enter the name of the VOR in the field «Name»: for example CHAMBERY.
Attention!: mark the option «Contains» !
Click on the button «Search»
The waypoint (CBY) is then added to the flightplan.

At the same time, the Vector Map and also the GPS are updated.

Construct a complete new flightplan.

Menu «Flight Planner» -> «Current Flight Plan»
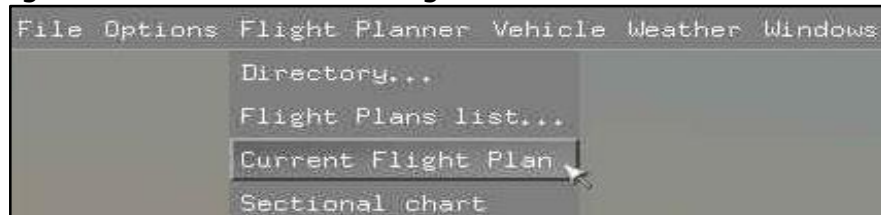
A windo «FLIGHT PLAN LOG» appears.
Click «New Plan from Scratch …» to remove an existing flightplan.
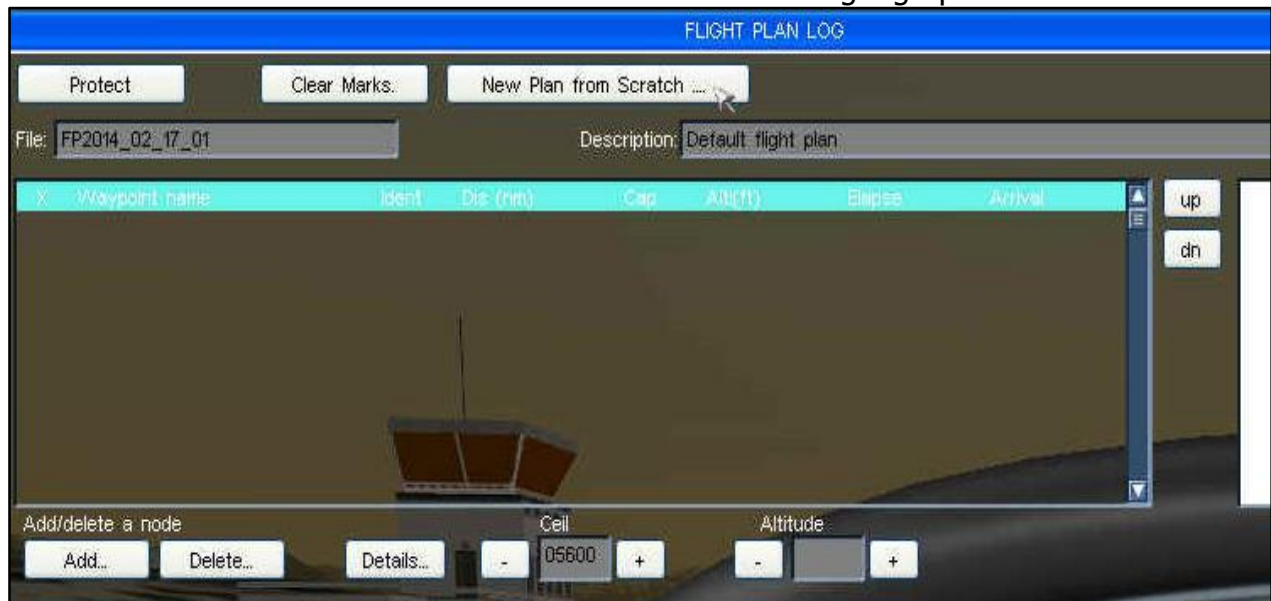
We will add a departure airport (Chambéry Aix Les Bains) to the flightplan.

Click on the button «Add …» and a window «Directory» appears.
Click «Waypoint type»: select AIRPORT.
Enter the name of the airport in the field «Name»: for example CHAMBERY.
Attention: mark the option «Contains» !
Confirm by click on the button «Search»: the airport appears in the list.
Choose the desired airport from the list: for example CHAMBERY AIX LES BAINS
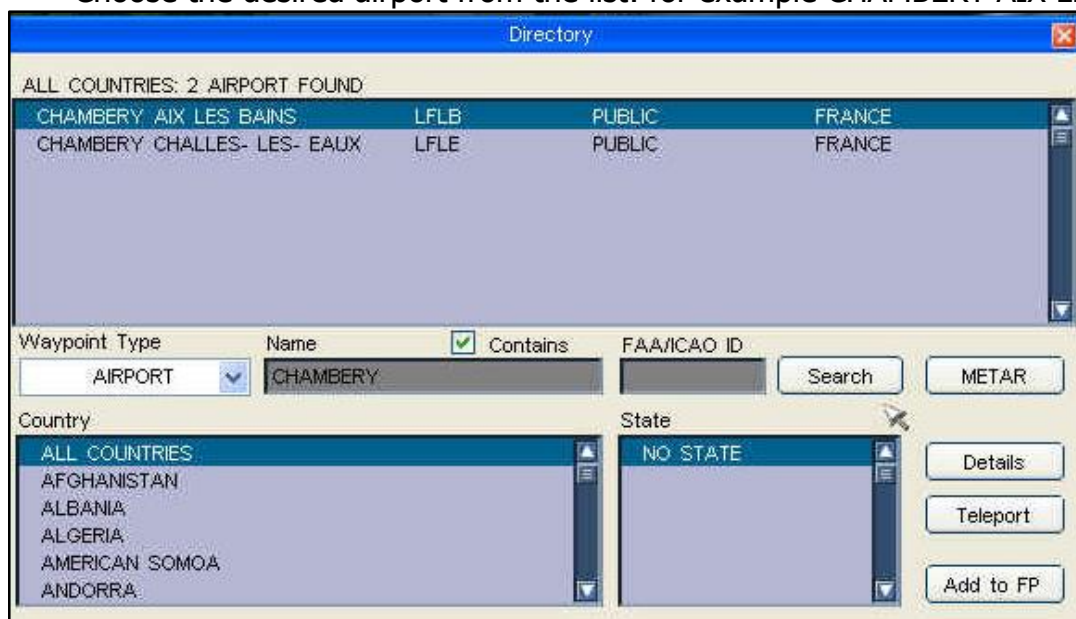
Click on the button «Add to FP» to add the airport to the flightplan.
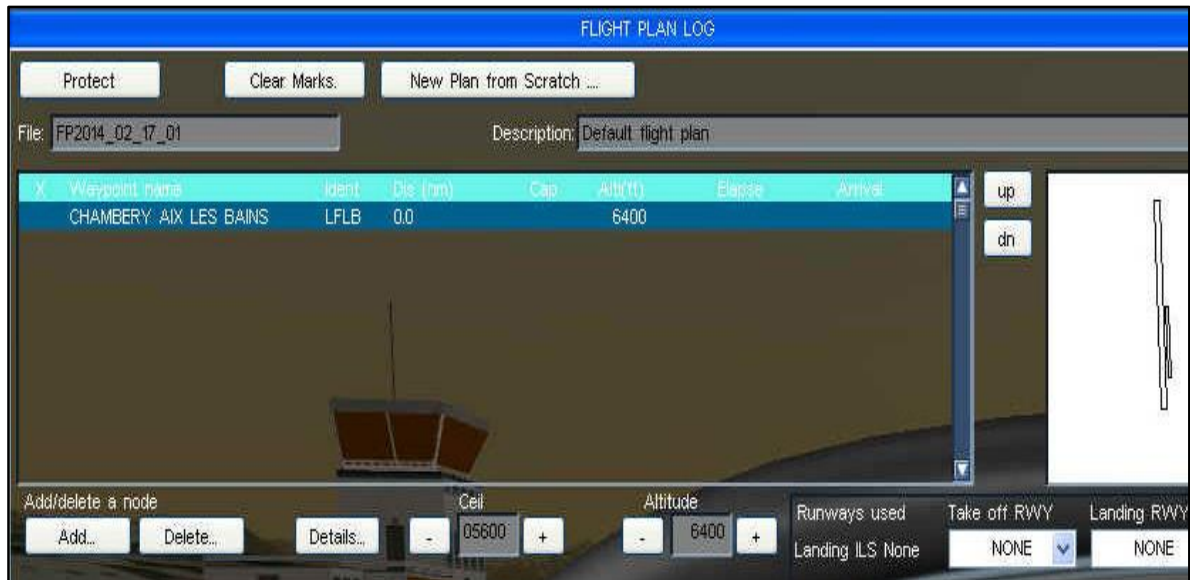
Click on the button «Take off RWY», to be able to choose the departure runway. For example: runway 36L.
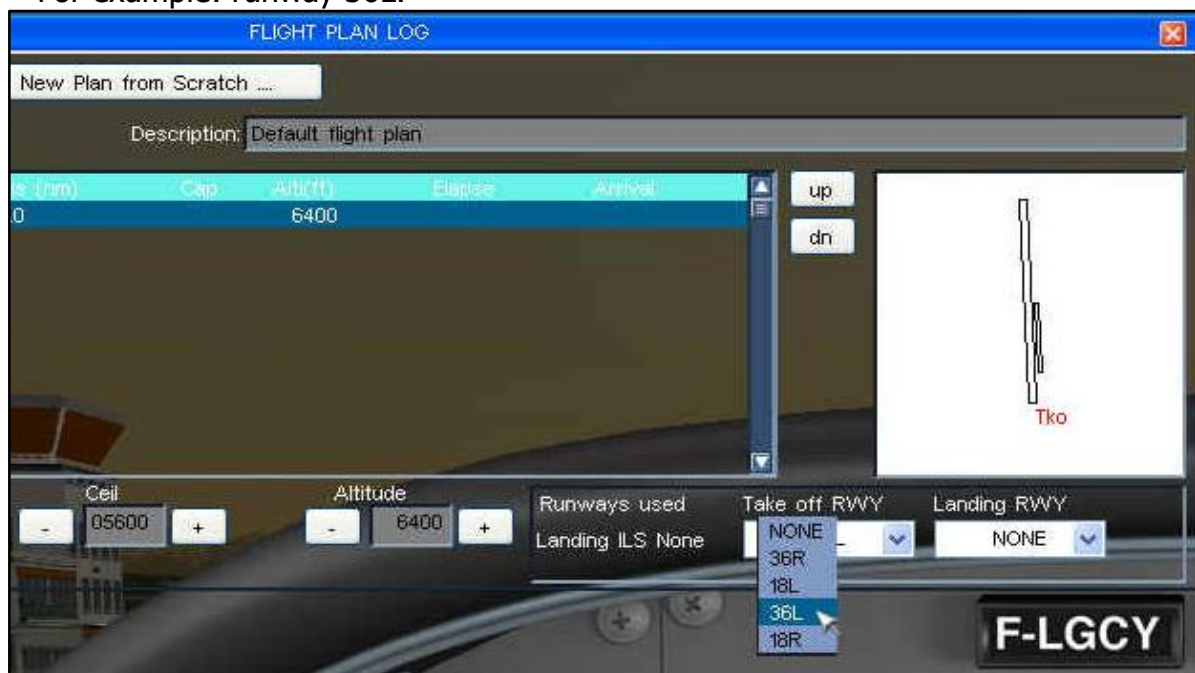
Click on the button «Details»: a window «Airport Détails» appears.
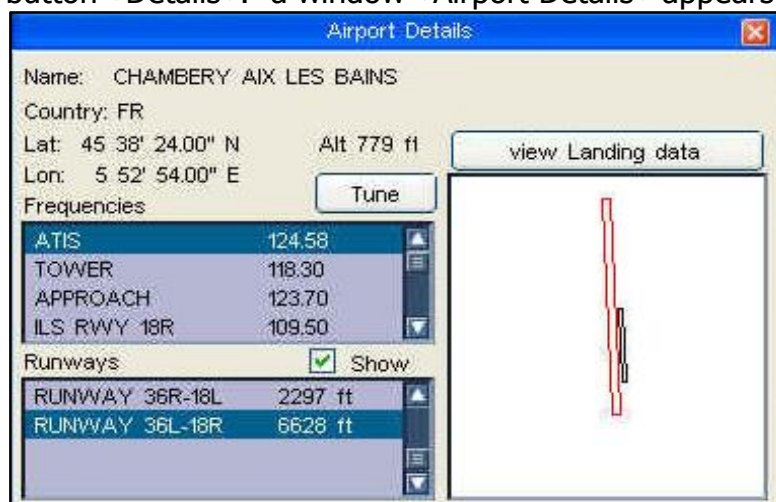
We will add a VOR (Chambéry CBY) to the flightplan.

Click on the button «Add …» and a window «Directory» appears.

Click «Waypoint type»: select VOR.

Enter the name of the VOR in the field «Name»: for example CHAMBERY.

Attention: mark the option «Contains» !

Confirm by click on the button «Search»: the VOR appears in the list.

Click on the button «Add to FP» to add the VOR to the flightplan.
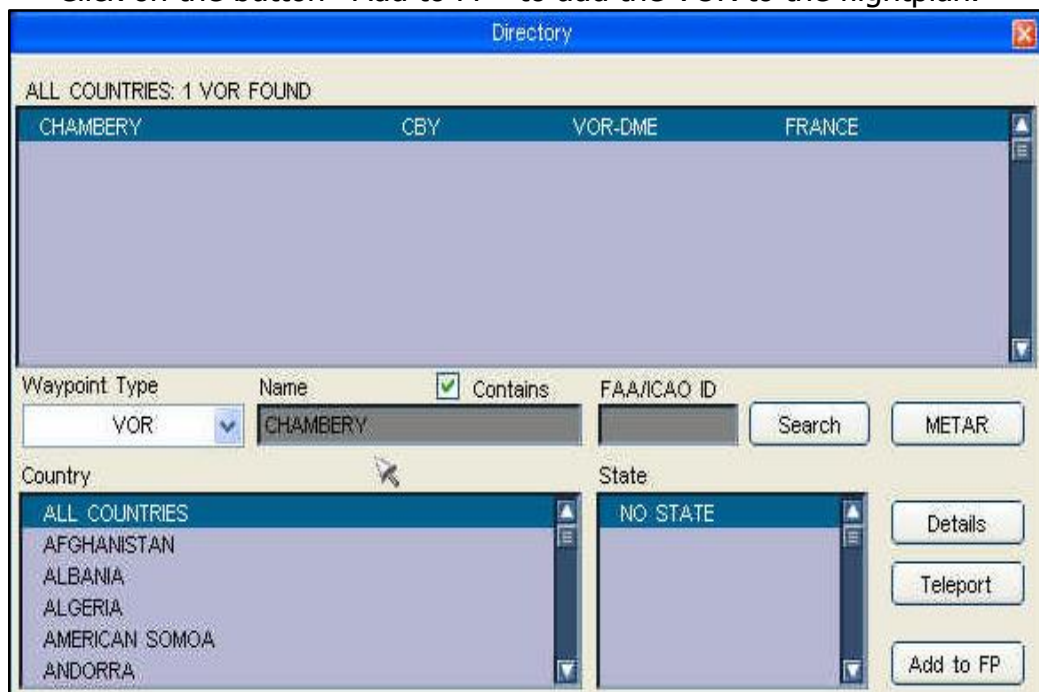
The VOR (Chambéry CBY) is now added to the flightplan.
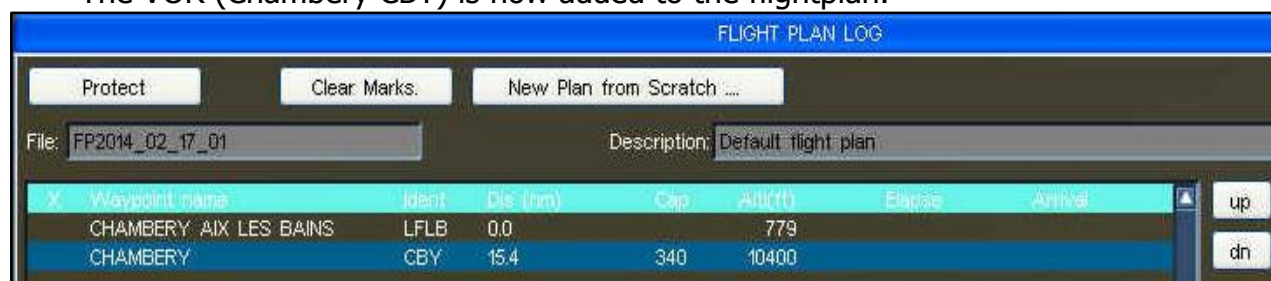
And also to the Vector Map.

We will add a "user waypoint" to the flightplan.

Open the Vector Map (Menu «Windows» -> «Vector Map»)

Mouse left-click on any preferred location in the map: a window appears at that spot.

Choose «Add a waypoint to Flightplan»: the user waypoint is added to the flightplan.
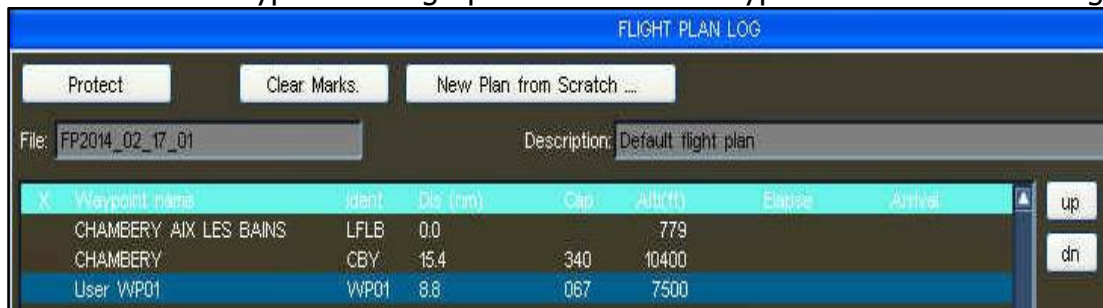
And also into the Vector Map.

We will add a second "user waypoint" to the flightplan.

Open the Vector Map (Menu «Windows» -> «Vector Map»)
Mouse left-click on any preferred location in the map: a window appears at that spot.

Choose «Add a waypoint to Flightplan»: the user waypoint is added to the flightplan.

We will add a third "user waypoint" to the flightplan : according the same procedure.

We will add the destination airport (Annecy Meythet LFLP) to the flightplan.

Click on the button «Add …» and a window «Directory» appears.
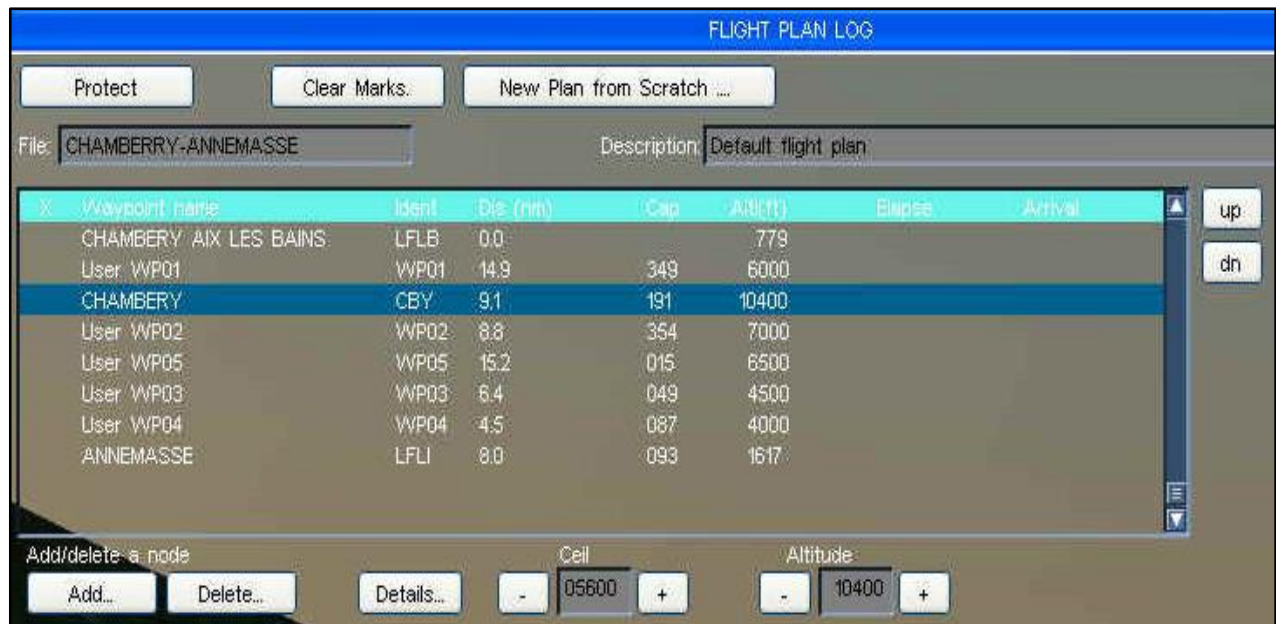Click «Waypoint type»: select AIRPORT.
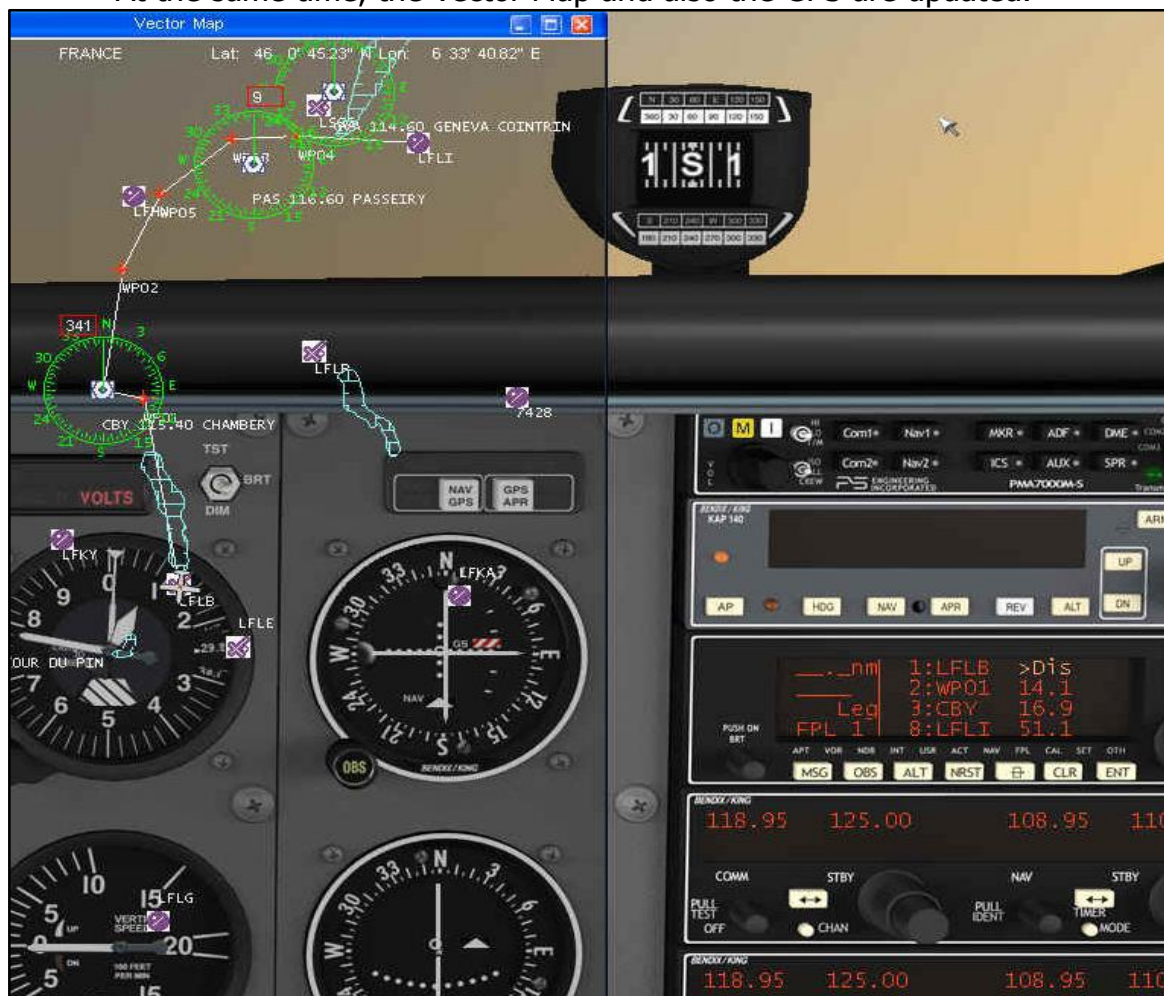Enter the name of the airport in the field «Name»: for example ANNECY.
Attention: mark the option «Contains» !
Confirm by click on the button «Search»: the airport appears in the list.
Choose the desired airport from the list: for example ANNECY MEYTHET
Click on the button «Add to FP» to add the airport to the flightplan.

Click on the button «Landing RWY»: choose the landing runway. For example 04L.
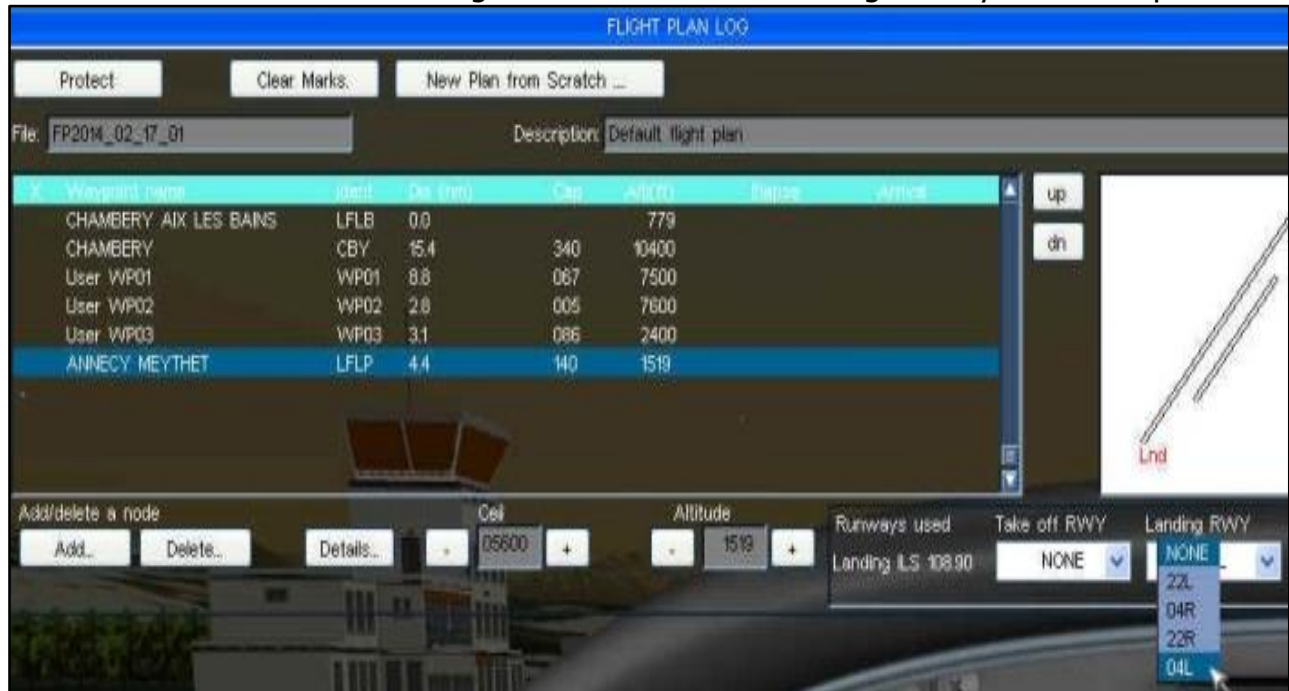
The flightplan is available in the GPS:

The flightplan is also represented in the Vector Map:

Change the sequence of the flightplan waypoints in the «FLIGHT PLAN LOG»

Choose the waypoint to change in the «FLIGHT PLAN LOG»

Change the sequence by mouse click on the buttons «up» or «dn».

Save a flightplan

The flightplan is saved when we quit the «FLIGHT PLAN LOG».

Remove a «waypoint» from the flightplan in the «FLIGHT PLAN LOG»

Choose the waypoint to remove in the «FLIGHT PLAN LOG» (For example User WP03)

Click on the button «Delete …»

Modify the location of a "user waypoint" in the flightplan by using the Vector Map.

Sustained mouse click on the «user waypoint» to modify in the Vector Map.

Move the «user waypoint» to the desired spot in the map, and release the mouse-click.

The «FLIGHT PLAN LOG» and also the GPS are updated in real time.

Change the altitude of a flightplan «user waypoint».

Choose the «waypoint» to modify in the «FLIGHT PLAN LOG»   (User WP01)

Click on the button «Altitude - or + » in order to change the altitude.
For example :   User WP01   Alt 3000 feet.

Consult a «Sectional chart» (VFR chart)

Menu «Flight Planner» -> «Sectional chart»

The sectional chart available in the Fly! Legacy sub-directory «Documents» appears.
(Remark: Fly! Legacy version 1.2.7 has no sectional charts yet)

The VIRTUAL PILOT in Fly! Legacy.

Fly! Legacy features a VIRTUAL PILOT, who can fly in demo mode the active flightplan.

Load a flightplan: menu «Flight Planner» -> «Flight Plans list … »
(As already explained before: refer to "Load an existing flightplan.)

The flightplan represented in the Vector Map.

Call the virtual pilot: menu «Vehicle» -> «Virtual pilot»
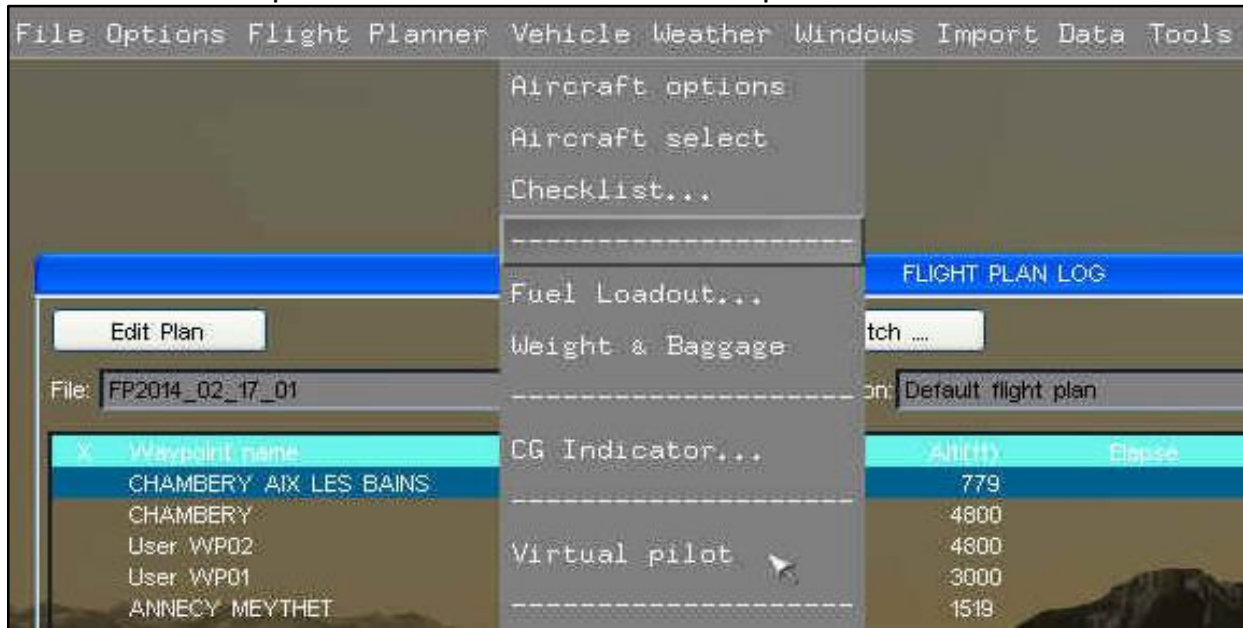
The aircraft is teleported towards the departure runway, and ready for take-off.
After a few seconds, a message «Aircraft is now all your's» appears.
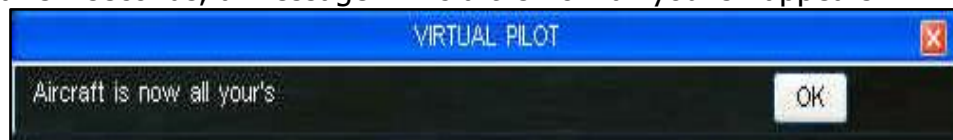
Confirm the mode «Virtual pilot» by mouse click on the button «OK».
Open the Throttle (black lever) of the Cessna.
The virtual pilot operates the Cessna, performs the take-off and follows the flightplan.

You only need to operate the flaps and the throttle.

The progression of the flight can be monitored via the Vector Map and also via the «FLIGHT PLAN LOG».
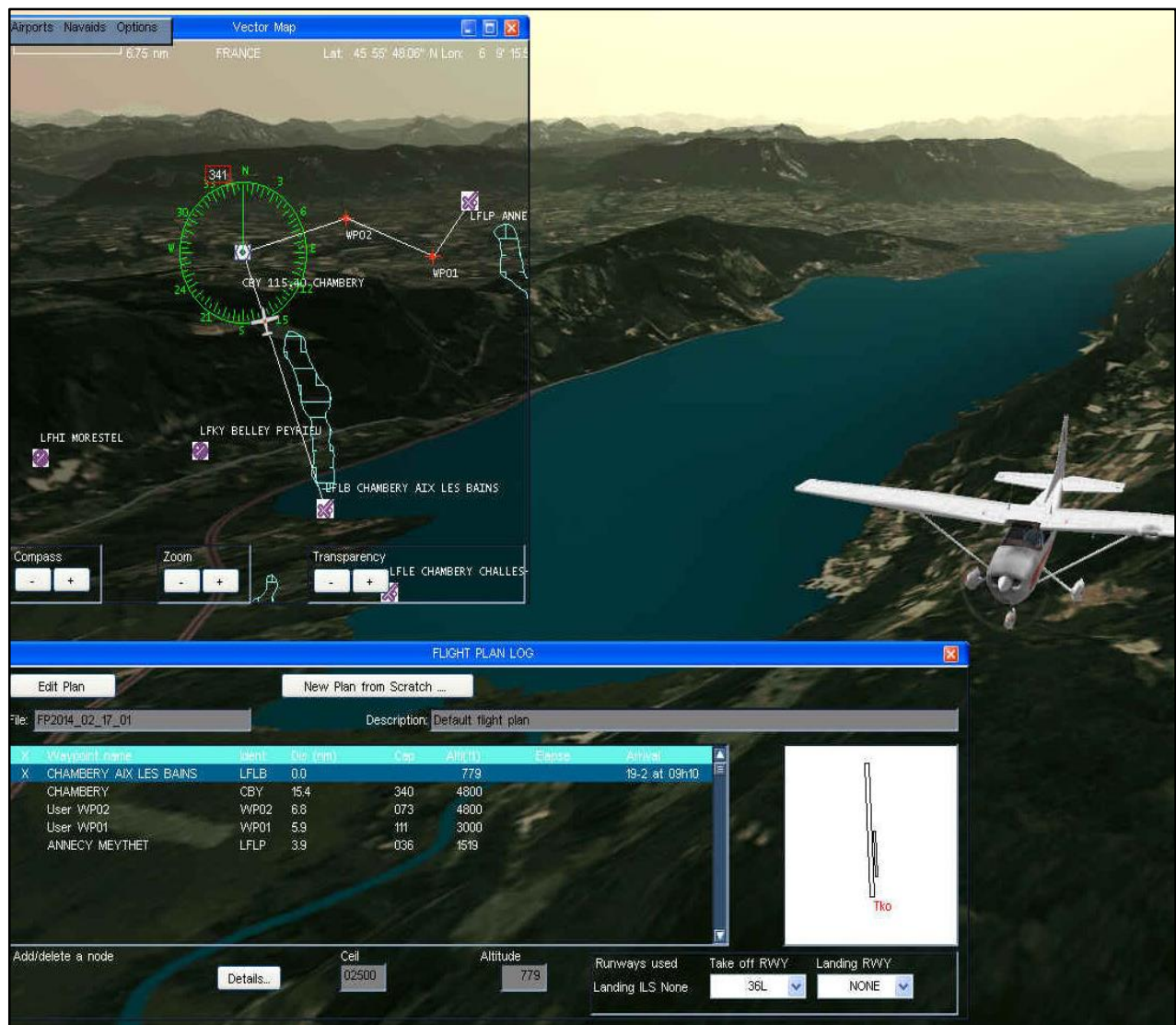
Have smooth virtual flights.

Chapter 8

Overview of the Fly! Legacy menu

Chapter 8: overview of the Fly! Legacy menu

Press the keyboard spacebar to display the menu-bar.

The menu «File»

«Save Situation»: to save a simulation situation.

Choose «File» -> «File Save Situation …» to save the actual flightsim situation.
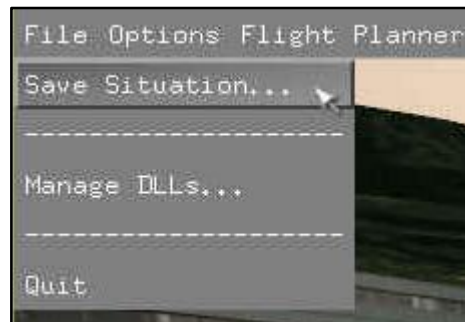
That situation will be loaded during the next Fly! Legacy startup.

«Manage DLLs …» Management of DLL (Dynamic Link Library)

Choose «File» -> «Manage DLLs …» to manage the DLL files of Fly! Legacy.
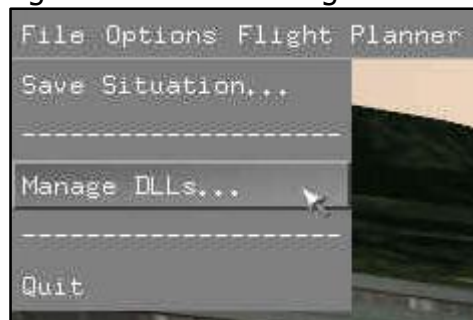
A window «Manage DLLs» appears.
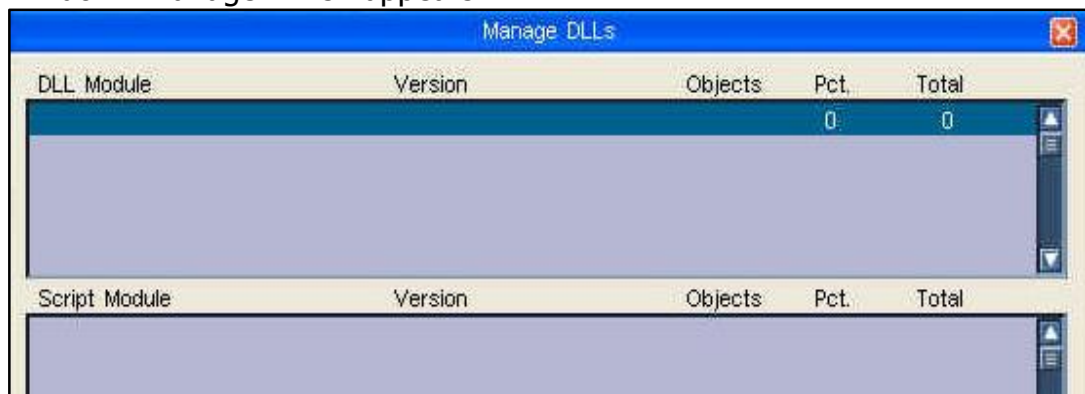
Fly! Legacy (version 1.2.7) : the window does not show DLL.

«Quit» : to exit Fly ! Legacy

Choose «File» -> «Quit» to exit the simulateur Fly! Legacy.

The menu «Options»

«Keyboard & Buttons … »

Choose «Options» -> «Keyboard & Buttons …»

A window «Keys & Buttons» appears.

This window allows us to assign or remove:
- a keyboard key to a Fly! Legacy function.
- a joystick or controller button to a Fly! Legacy function.

For more details: *chapter 3 "Assign actions to the different controller buttons"*

«Joystick» (Controller)

Choose «Options» -> «Joystick»
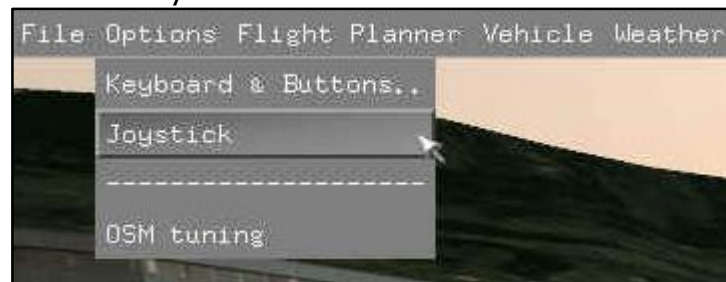
A window «Setup Axes» appears.
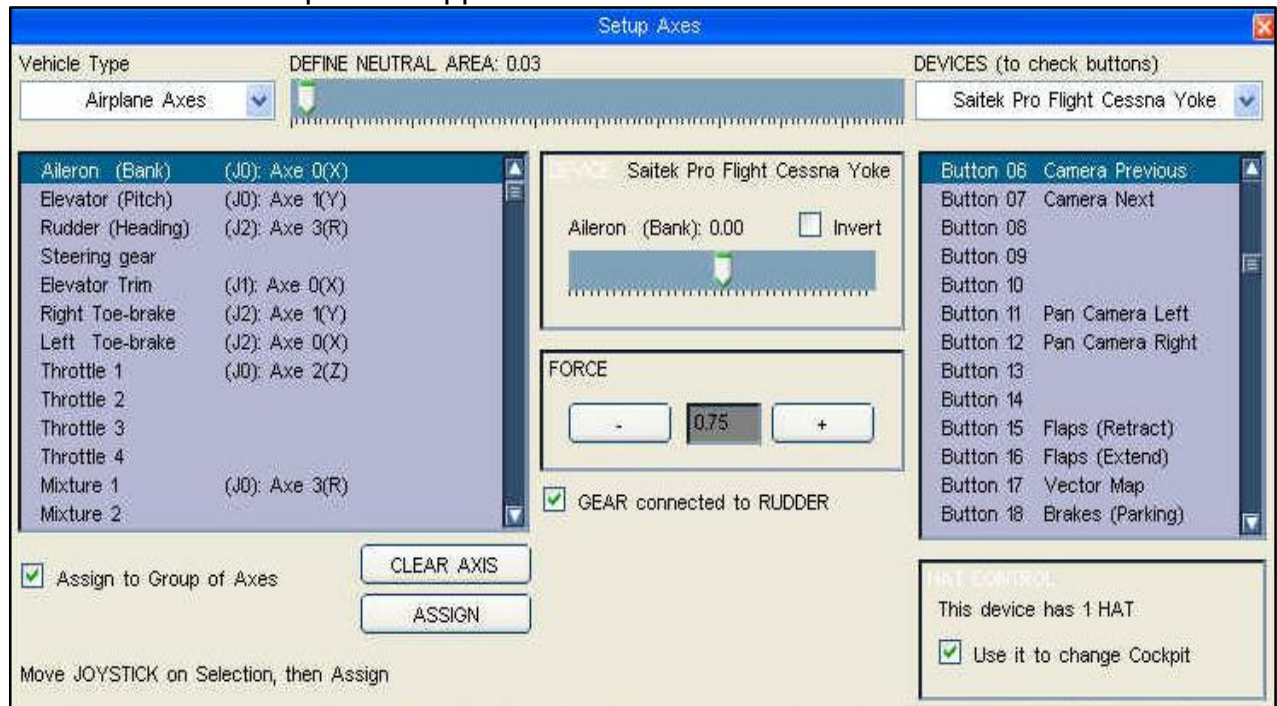
This window allows us to:
- assign or remove joystick (controler) axes to an axe of Fly! Legacy.
- change the axe characteristics:
  - «FORCE» (gain)
  - «Neutral Area» (null zone)
  - «Invert» (to invert the axe direction)

For more details: *chapter 2 «Assign axes to controller (joystick)»*

«OSM tuning» (Open Street Map)

Choose «Options» -> «OSM tuning»

A window «OSM tuning» appears and allows us to activate oe de-activate the components of the OSM scenery (based on Open Street Map).
Example at the city of Annemasse: all the OSM components are activated.

Example at Annemasse: «OSM FOREST» is de-activated, and the forest disappears.

Fly.Simvol   **Fly! Legacy: user guide**

The menu «Flight Planner»

«Directory …»

Choose «Flight Planner» -> «Directory …»
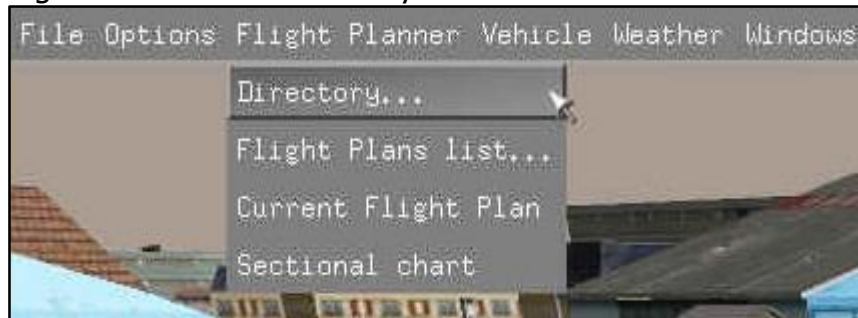
A window «Directory» appears.
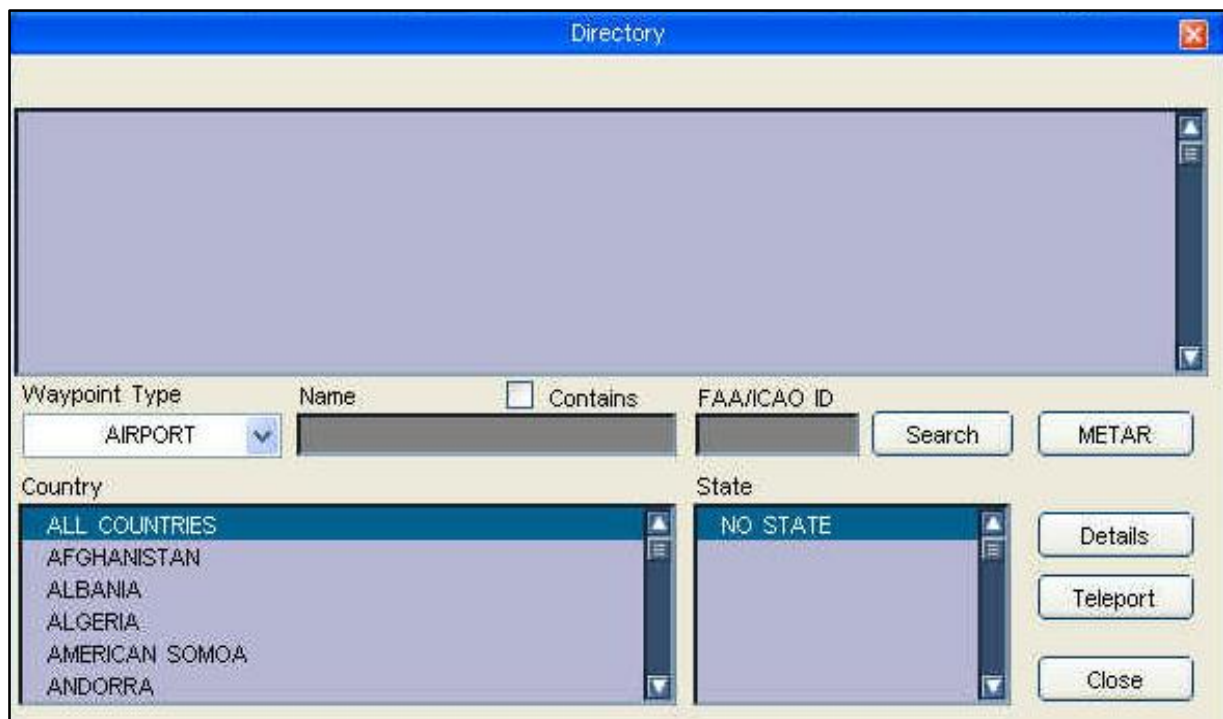
This window allows us to select a departure airport to teleport at.
For more details: *chapter 7 «The integrated Flightplanner»*

«Flight Plans list … »

Choose «Flight Planner» -> «Flight Plans list … »

FD 12/07/14   84/176
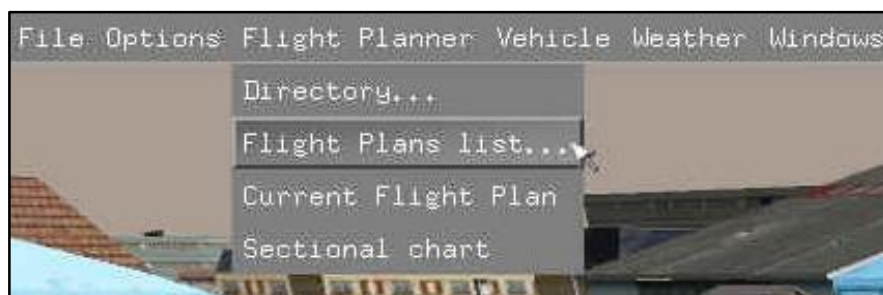
A window «FLIGHT PLAN MANAGER» appears.
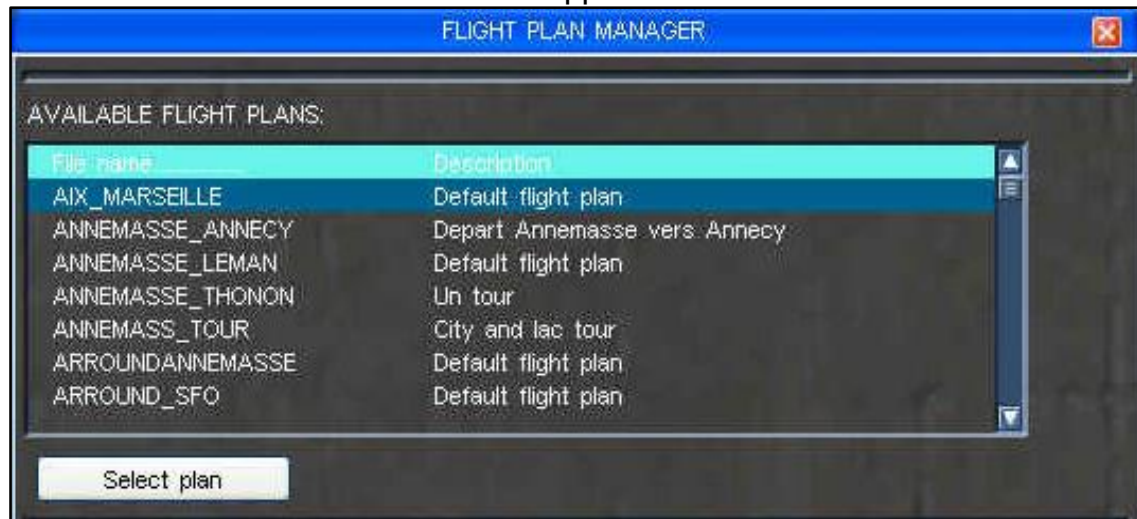
This window provides an overview of flightplans, and permits to select a flightplan.
For more details: *chapter 7 «The integrated Flightplanner»*

«Current Flight Plan»

Choose «Flight Planner» -> «Current Flight Plan»
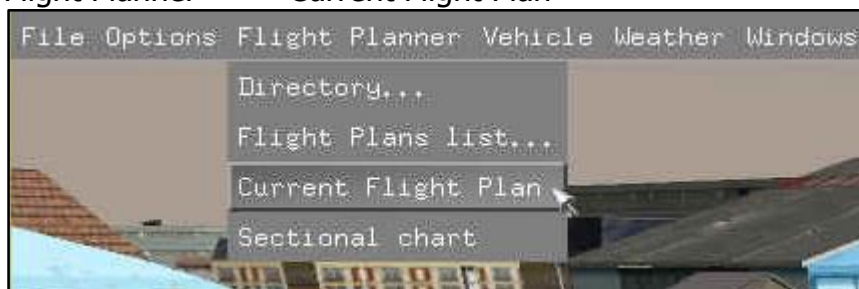
A window «FLIGHT PLAN LOG» appears.
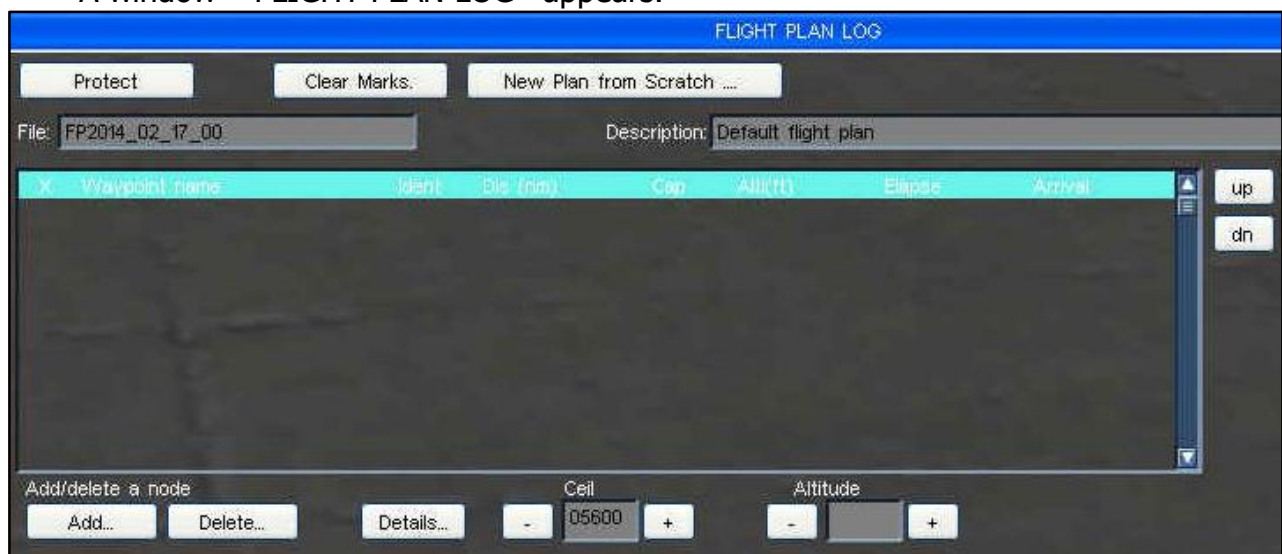
This window allows us to:
- create a new flightplan
- edit an existing flightplan.

For more details: *chapter 7 «The integrated Flightplanner»*

«Sectional chart»

Choose «Flight Planner» -> «Sectional chart»

The sectional chart available in the Fly! Legacy sub-directory «Documents» appears.
(Remark: Fly! Legacy version 1.2.7 has no sectional charts yet)

The menu «Vehicle»

«Aircraft options»

Choose «Vehicle» -> «Aircraft options»

A window «AIRCRAFT OPTIONS» appears.

This window provides selection possibilities for several aircraft options.
The automatic pilot «AUTO PILOT»
            «Auto Land»: automatic landing.
            «Auto Disconnect»: disconnect the automatic pilot.

«Draw Smoke»: activate the engine smoke trail from the aircraft.

«Draw Shadow»: activate the aircraft shadow projected on the terrain.

«Draw Position»: activate the red trails representing part of the pattern flown.

«Draw Aero vectors»: activate the vectors of the aircraft aero model.
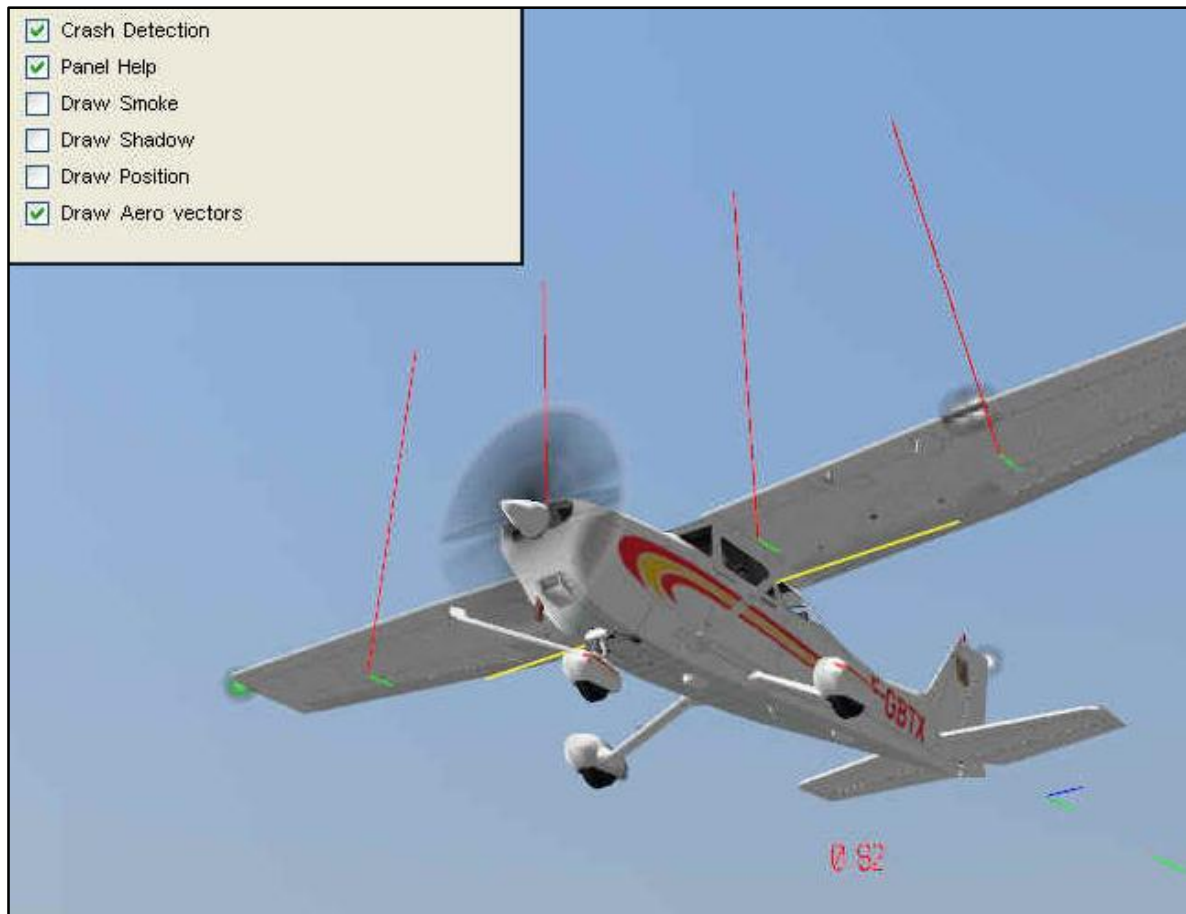
The value 0.82 = value representing the elevator trim position.
The vectors of the aero model: coloured lines which change their amplitude during flight, and which represent lift, drag, … of the aircraft.

«Aircraft select»

Choose «Vehicle» -> «Aircraft select»
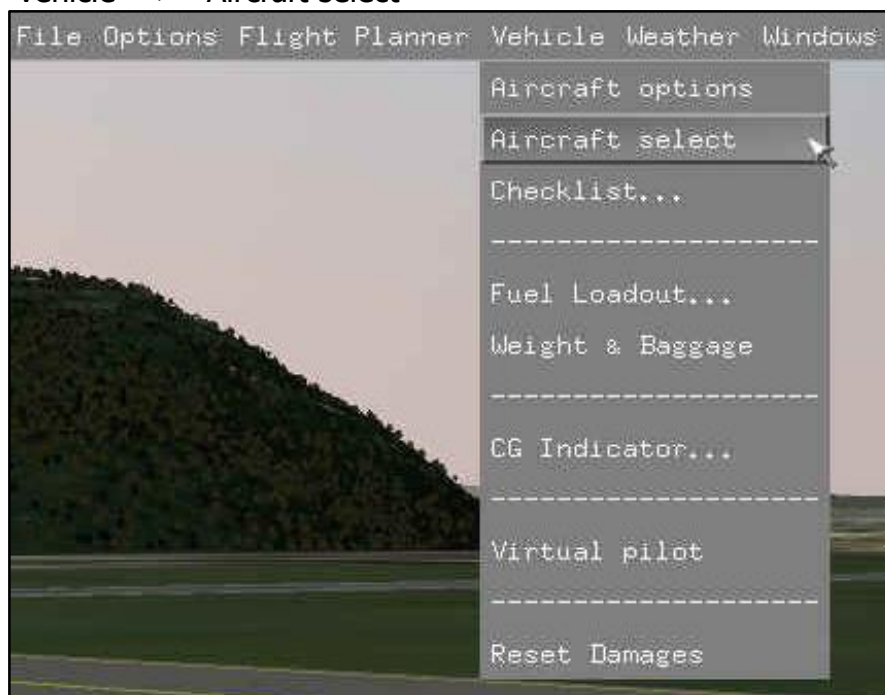
A window «Select Aircraft» appears, and allows us to select an aircraft.
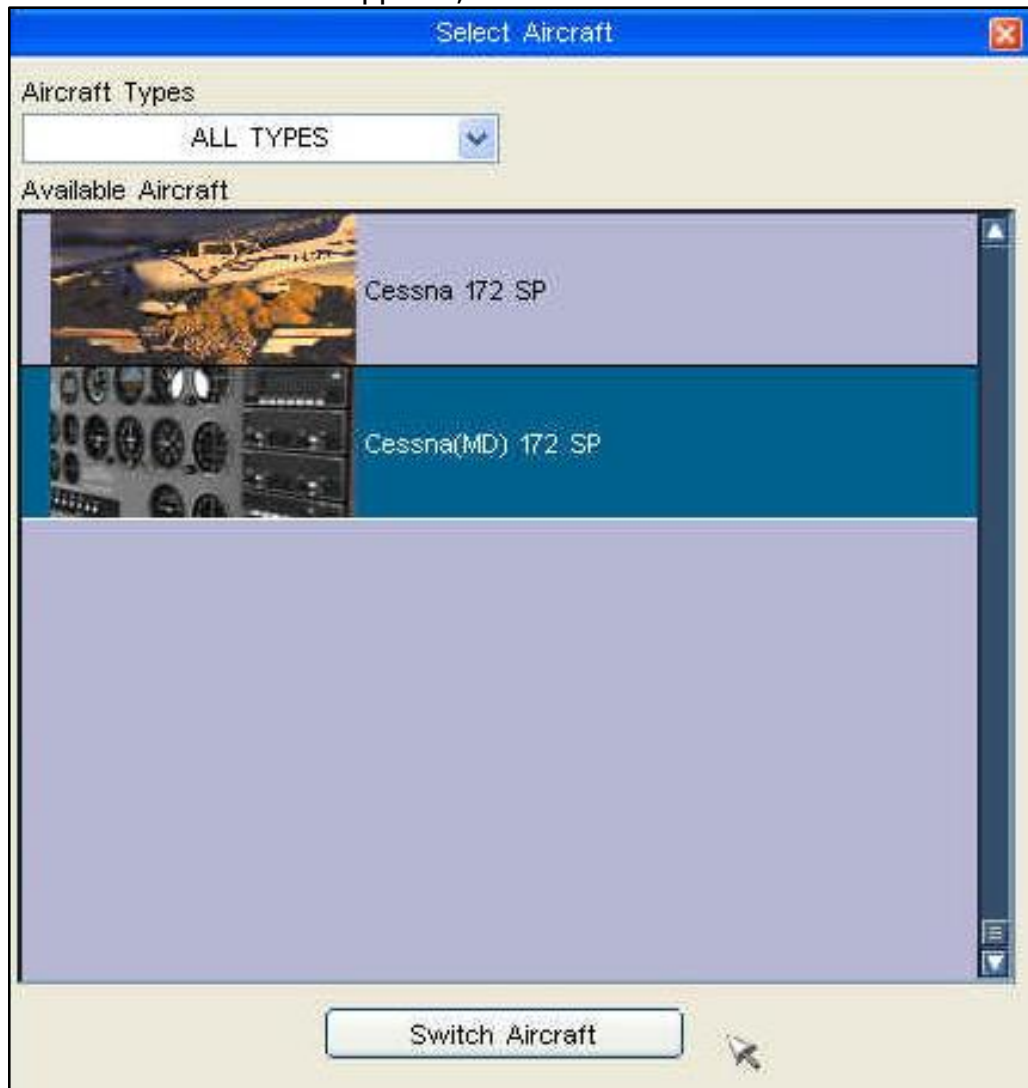
In Fly! Legacy (version 1.2.7) we can choose between:

Cessna 172SP	Cessna (MD) 172SP
High resolution	Medium resolution
	(for less performant computers)

«*Checklist …*»

Before doing the checklist, we must perform an exterior inspection of the airplane. We have to verify fuselage and wings, control surfaces, oil and fuel level.

Fly! Legacy has an integrated checklist, available via the menu *Vehicle – Checklist …*

A CHECKLIST window appears.

Mouse click on «CHAPTER» to consult the different chapters of the checklist.

The central window shows the checklist items to be verified.

Four buttons available:

«DONE»	= mark the check item as checked.
«LOCATE»	= focus the screen on the device (selector, lever, button, or switch) to be activated.
«UNCHECK ALL»	= reset the checklist.
«EXECUTE»	= execute the action.

Chapter «Start Up»

«Engine Start»

«Set Avionic»: configuration of the avionics

«Notices»: notes related to the aircraft.

«Fuel Loadout …»

Choose «Vehicle» -> «Fuel Loadout …»

A window «FUEL MANAGER» appears, which allows us to change the fuel.
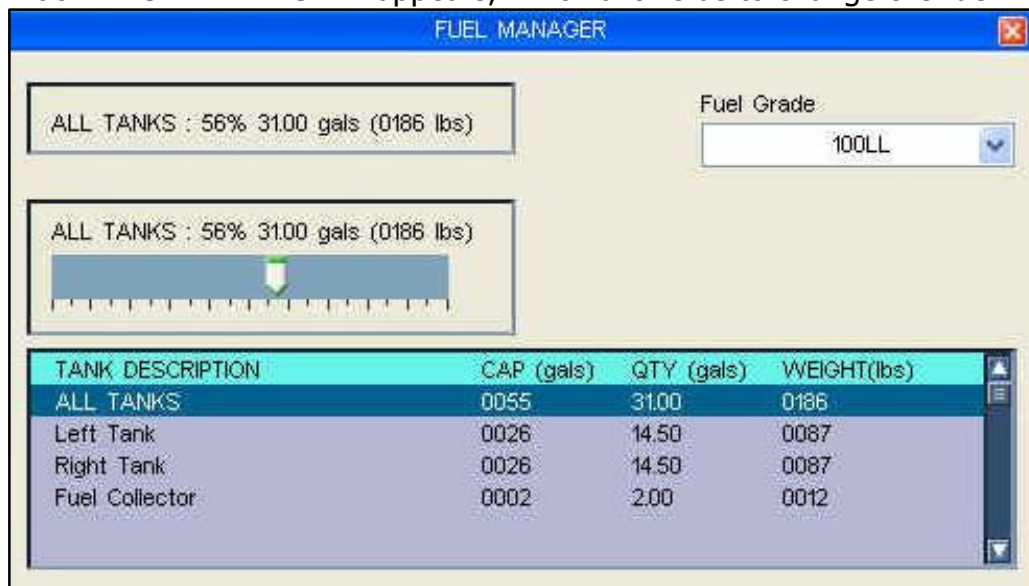
«Fuel Grade»: selection of fuel type.
For example: 100LL for the Cessna 172SP
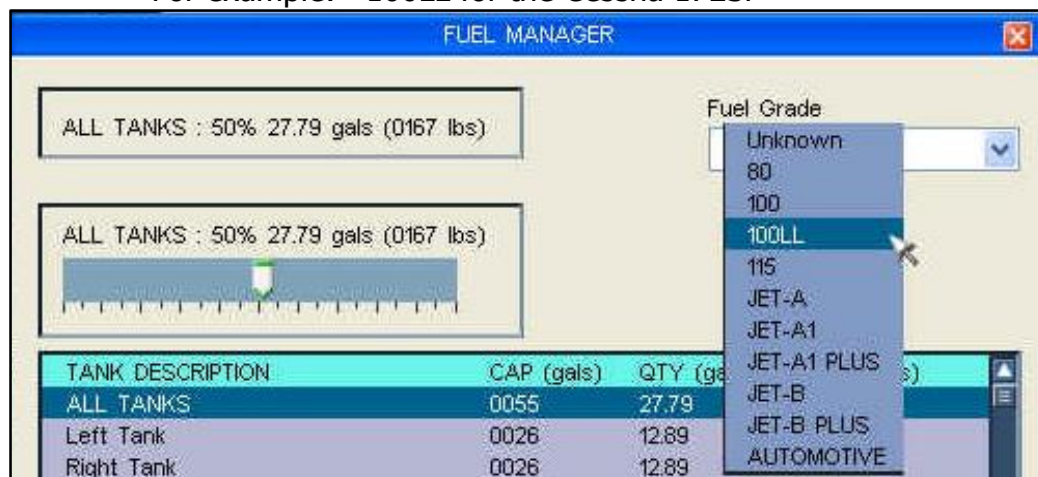
The list «TANK DESCRIPTION»:
> Mouse click in the list to select a fuel tank.
> Sustained mouse click on slider, and move the slider to change fuel quantity.

Example: we decreased the fuel quantity in the left fuel tank.
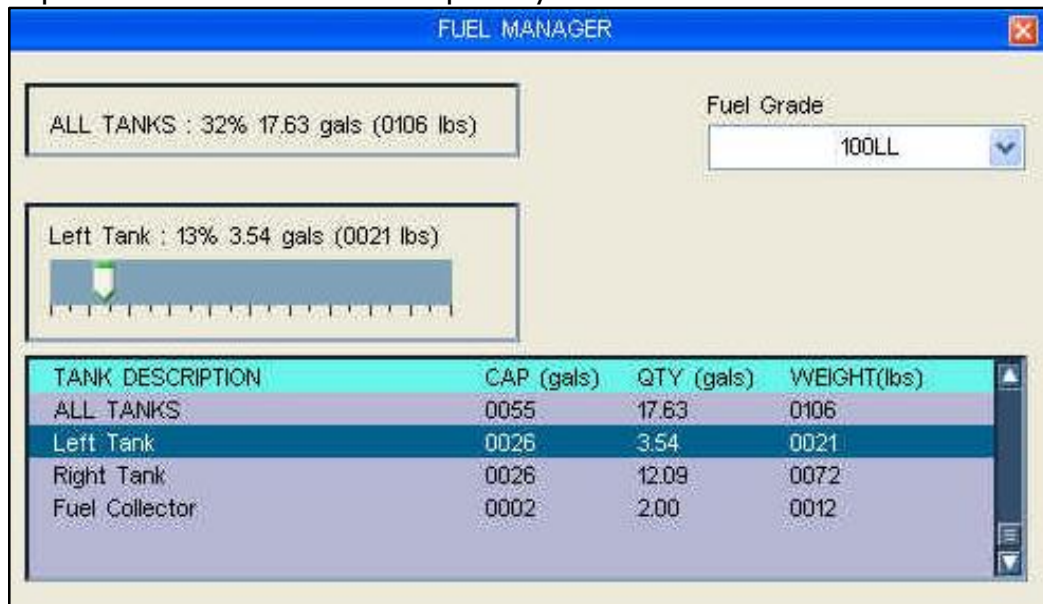
«Weight & Baggage»

Choose «Vehicle» -> «Weight & Baggage»

A window appears, which allows us to change the weight of passengers and luggage.
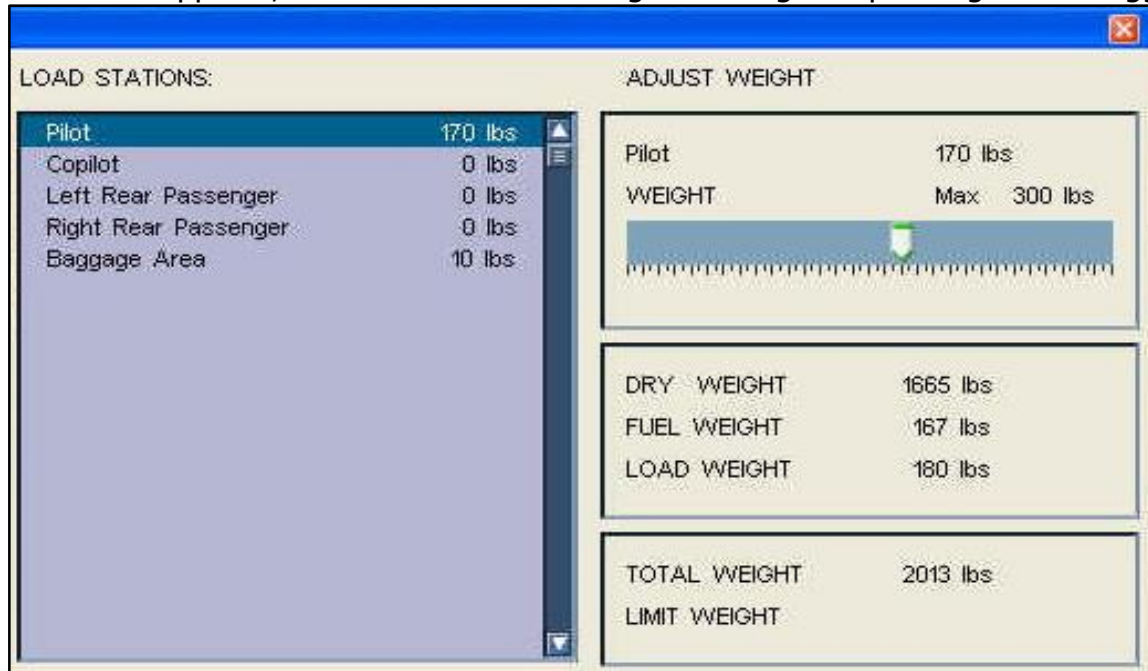
The list «LOAD STATIONS» shows the stations which can receive a load.
Mouse click on a desired station.
Sustained mouse click on slider, and move the slider to change the station load.

The result of the change is calculated and displayed:
- «DRY WEIGHT»:   weight without fuel, oil.
- «FUEL WEIGHT»:   weight of the fuel on board.
- «LOAD WEIGHT»:   weight of the pilot, passengers and luggage.
- «TOTAL WEIGHT»:   total weight.

«CG Indicator …» (Center of Gravity)

Choose «Vehicle» -> «CG Indicator …»
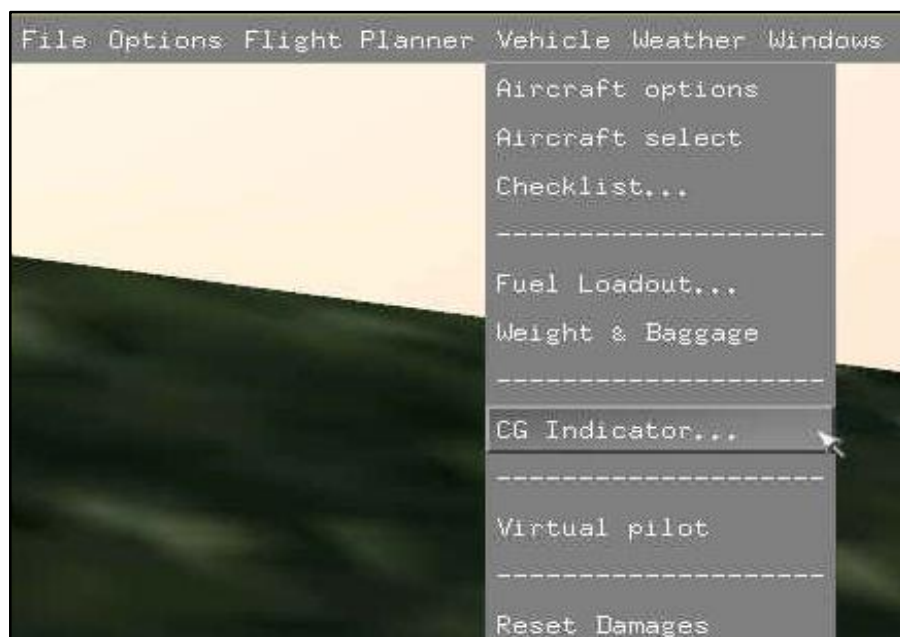
A window appears, which displays the aircraft.
Mouse click on button «CofG» to show the position of the aircraft center of gravity.

Mouse click on button «FRONT VIEW» to show the frontal view of the aircraft.
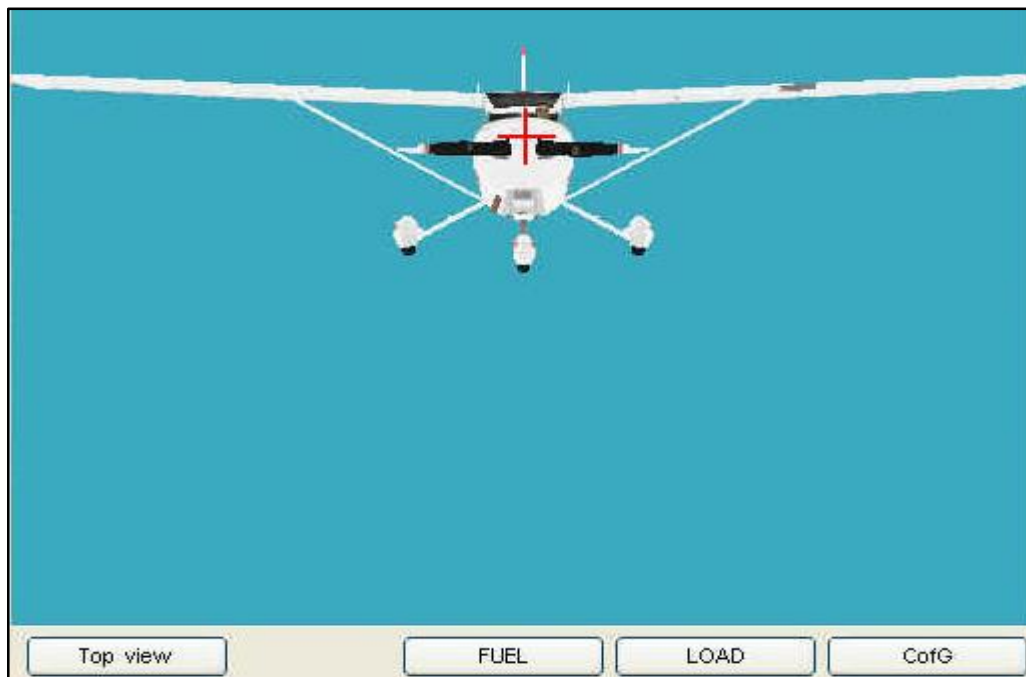
Mouse click on button «TOP VIEW» to show the sattelite view of the aircraft.
Mouse click on button «FUEL» to show the location of the fuel in the fuel tanks.
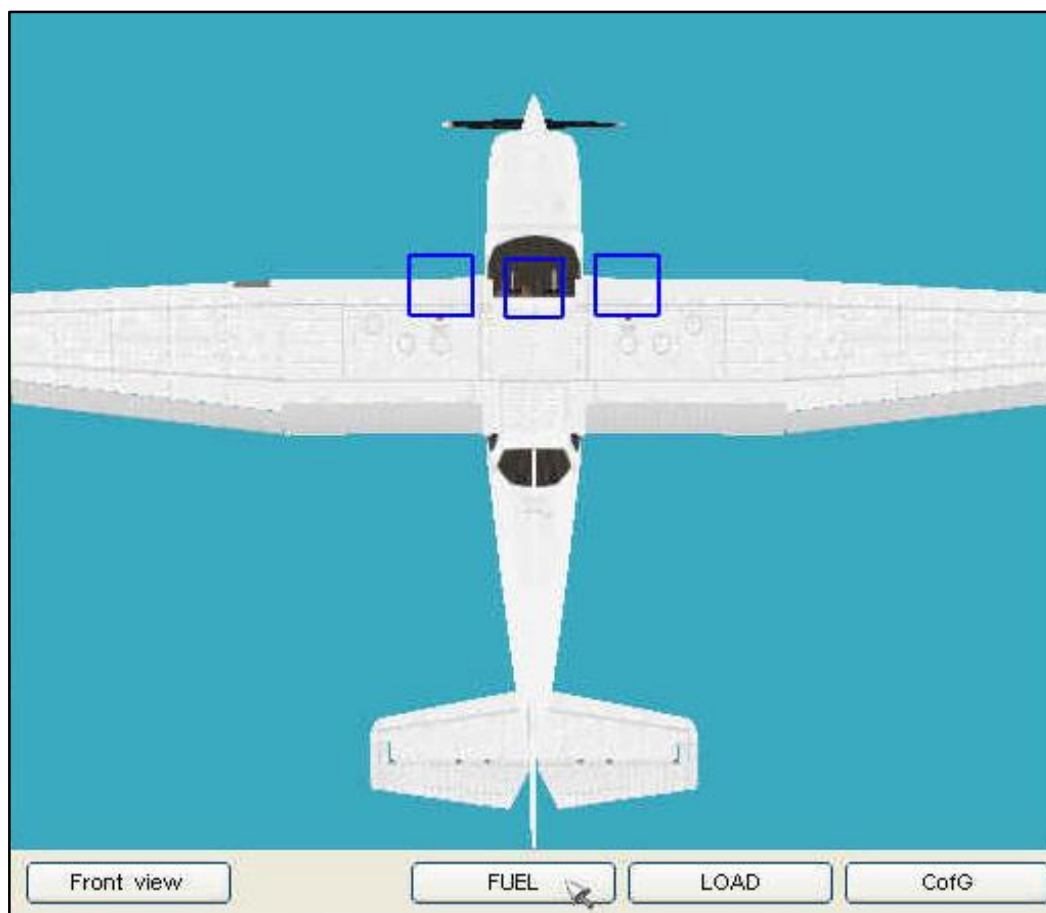
Mouse click on button «LOAD» to show the location of people and luggage on board.
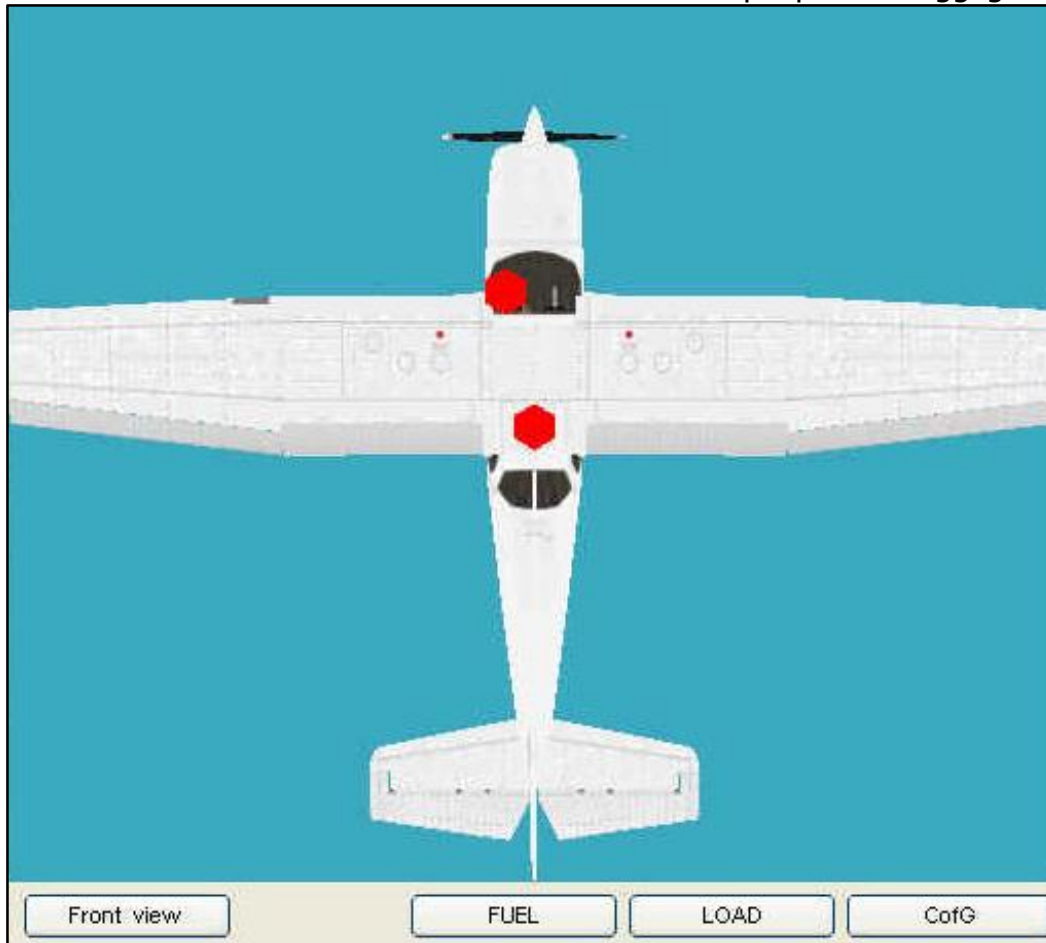
«Virtual pilot» (The flightplan is flown by a virtual pilot)

Choose «Vehicle» -> «Virtual pilot»

First, you need to have an active flightplan, to allow the virtual pilot to be prepared for the flight.
Consult chapter 7 *«The integrated Flightplanner»* to load or to generate a flightplan.
A window «VIRTUAL PILOT: Flight plan is empty» reminds us if no flightplan is active.

If a flightplan is active, and after selection of the menu «Virtual pilot», the virtual pilot becomes active:
- The aircraft is teleported to the axe of the departure runway
- Open the throttle (joystick): the aircraft starts rolling and perform the take-off
- The aircraft follows the active flightplan
- The aircraft will land onto the assigned runway in the flightplan.

Remark: the aircraft flaps are not operated by the virtual pilot.

Consult also chapter 7 *«The integrated Flightplanner»,* paragraph «The VIRTUAL PILOT in Fly! Legacy».

«Reset Damages» (Reset of the damaged aircraft)

After a crash or another aircraft problem, Fly! Legacy allows us to perform a RESET of the aircraft. After the RESET, a new aircraft is available.

Choose «Vehicle» -> «Reset Damages»

The menu «Weather»

«Overview»

Choose «Weather» -> «Overview»

A window «Weather Overview» appears and shows the weather at the airport.

«Winds & clouds»

Choose «Weather» -> «Winds & clouds»

A window «WIND LAYERS CONFIGURATION» appears, to allow us to configure the winds and the clouds.

A list shows an overview of the different wind layers.
Mouse click in the list to select a wind layer.
Configure the selected wind layer by mouse click on the buttons:
- «WIND ON/OFF»   activate / de-activate the wind layer.
- «TURBULENCE ON/OFF»   activate / de-activate the wind turbulence
- «ALTITUDE + / - »   change the altitude of the wind layer.
- «DIRECTION +/-10 +/-1» change the wind layer direction, in steps of 10 or 1.
- «SPEED +/-»   change the wind layer speed.

Configure the clouds.
    «CEIL +/-»   the altitude of the clouds.
    «CLOUD COVER»   select a cloud type via the drop-down window.

Example «Sky Clear»

Example «Stratus»

Example «Few clouds»
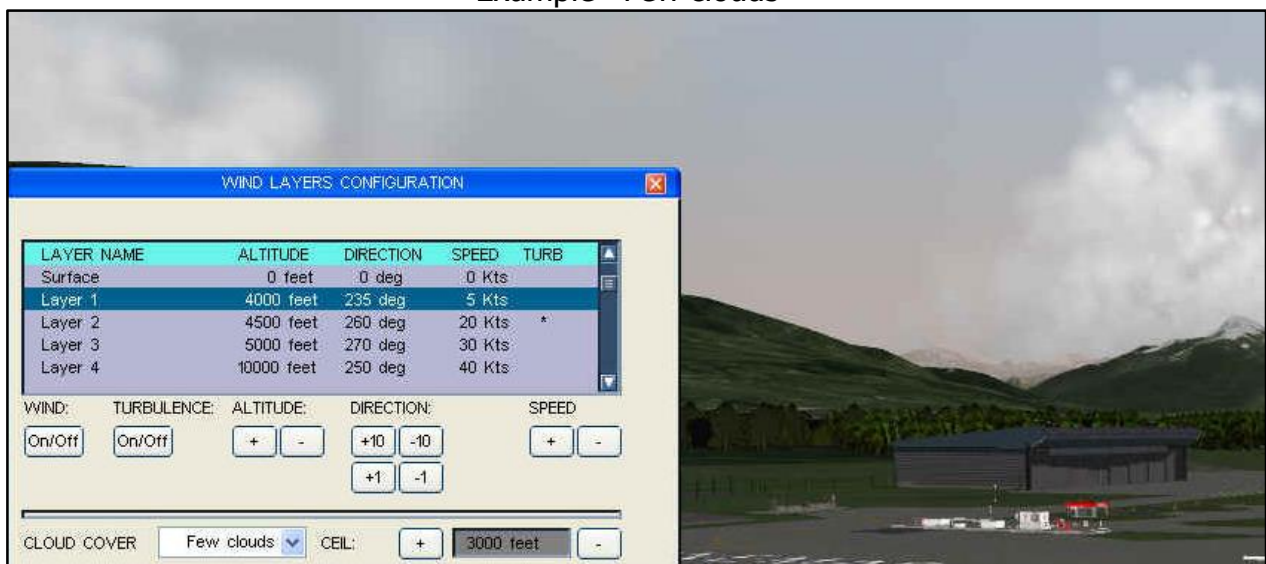
Example «Scattered»

Example «Half cover»

Example «Broken»
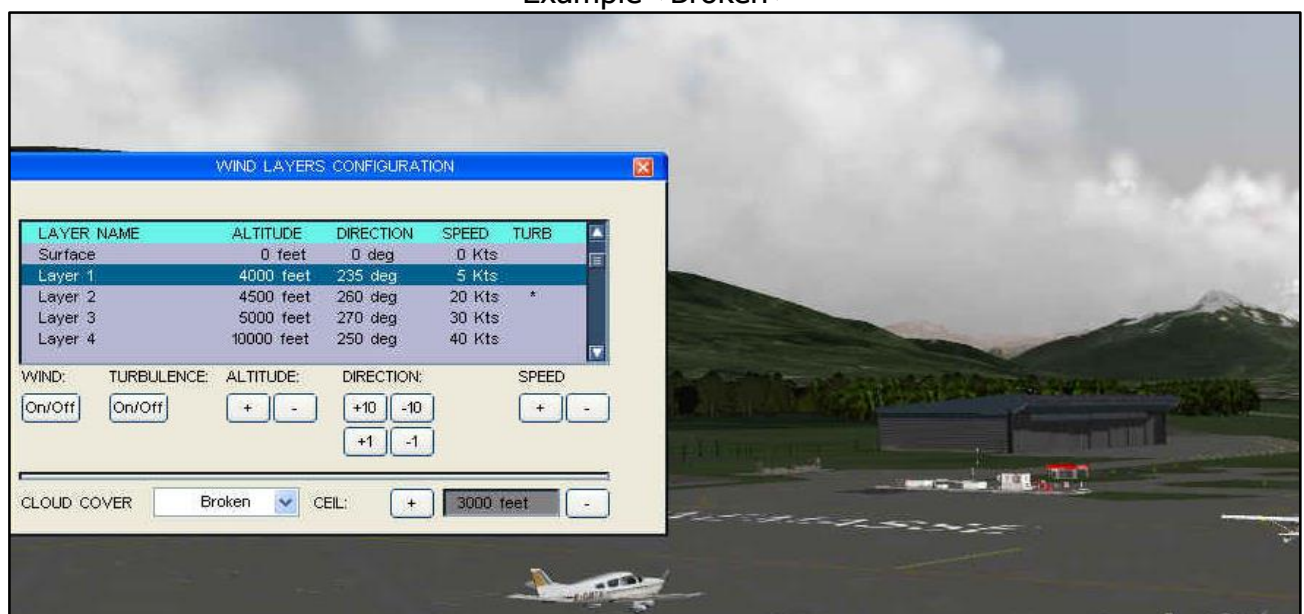
Example «Overcast»

«Sky Tweaker» (to adjust the colour and luminance of the sky)

In Fly! Legacy, the sky colour and luminance are calculated by a complex algorithm. The feature «Sky Tweaker» allows us to adjust the parameters of the algorithm.

Choose «Weather» -> «Sky Tweaker»

Fly! Legacy version 1.2.7: the feature «Sky Tweaker» is not accessible yet.

The menu «Windows»

«GPS Window»
Choose «Windows» -> «GPS window»
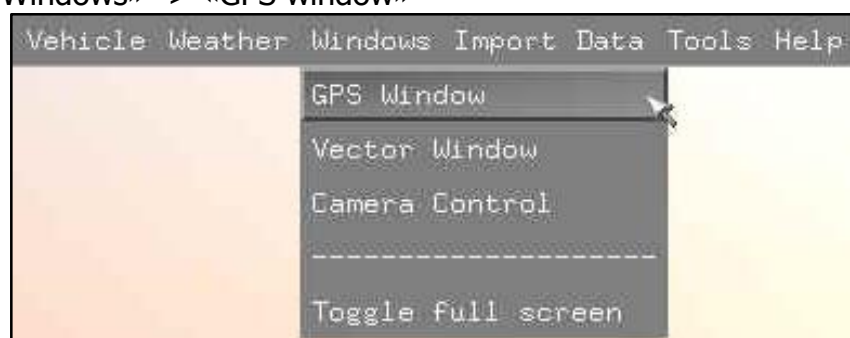
A window «KLN89 GPS» appears.

We are able to operate the GPS from this window, but also directly from the aircraft avionics panel.

A detailed documentation of the GPS is available in the FlyLegacy sub-directory «Doc» Consult the file «kln89.pdf».

«Vector Window»

Choose «Windows» -> «Vector Window»

The Vector Map appears: its a useful tool which supports the flightplan preparation and the navigation during the flight.
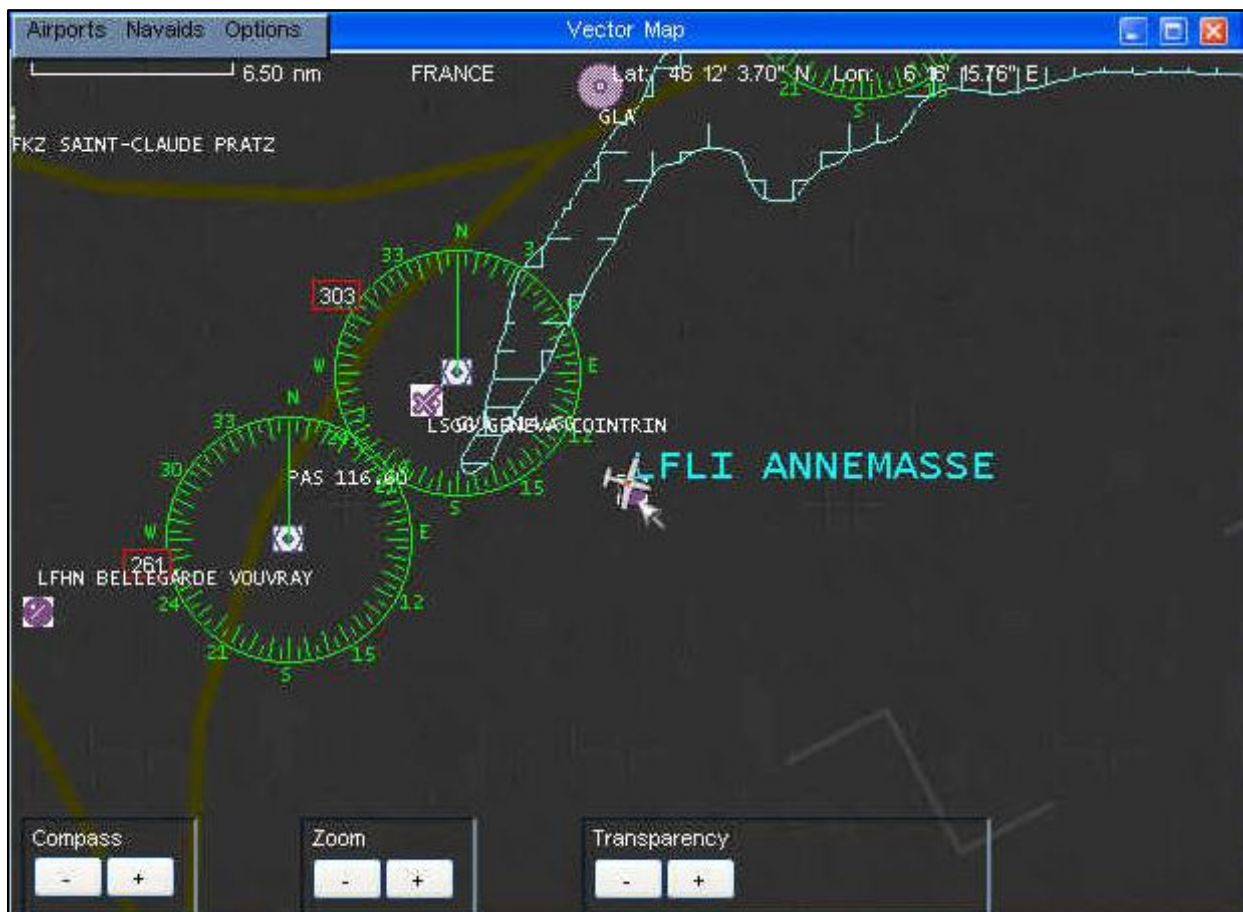
The Vector Map displays and provides acces to:

- Navaid details: NAVAID (VOR / NDB)
- documents (For example: approach charts, …)
- airport details
- flight plan

For more info, consult *chapter 6: «The integrated Vector Map»*.

«Camera Control»

Choose «Windows» -> «Camera Control»
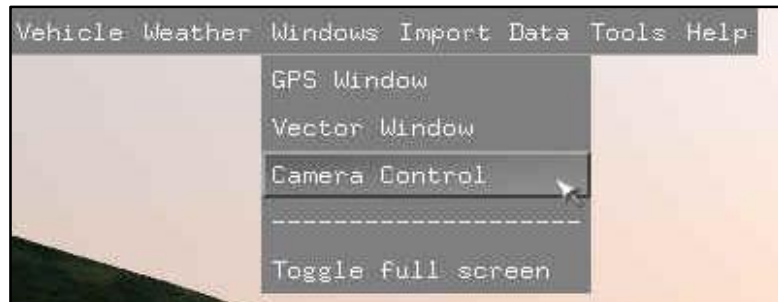
The camera control panel appears.

The buttons on the panel allow control of the exterial camera view.
- «Rotate» change the rotation (left / right) and pitch (down / up) of the camera.
- «Range» change the distance from the camera to the object.
- «Zoom» change the zoom of the camera image.
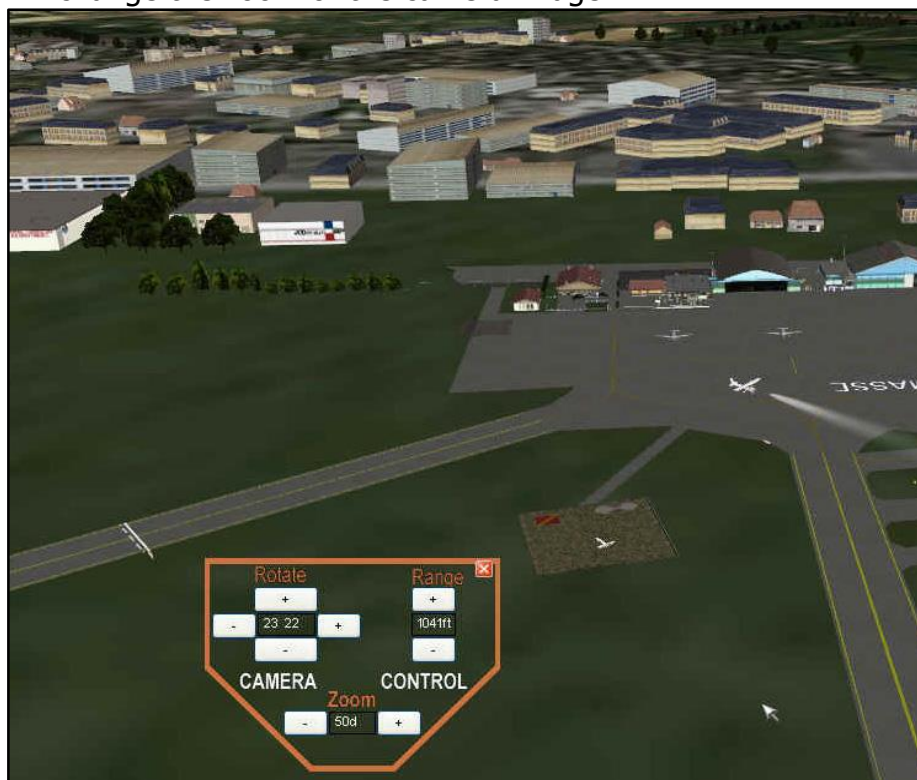
Remark:

Keyboard key «C» = cyclic change of the viewpoint:

- Cockpit: «Camera Control» allows to select panoramic cockpit views.
- External aircraft: «Camera Control» is operational.
- Observer: «Camera Control» is operational.
- Fly-by: «Camera Control» is not operational.
- Tower: «Camera Control» is not operational..
- Sattelite: only the «Range» of the «Camera Control» is operational.

«Toggle full screen»

Choose «Windows» -> «Toggle full screen»

Toggle to change the simulator view between «windowed» and «full screen».

Remark: pess the keyboard spacebar to display the menu-bar.

The menu «Import Data»

Data import is only useful for the developers of Fly! Legacy.
In Fly! Legacy version 1.2.7, this menu is not accessible for the user.
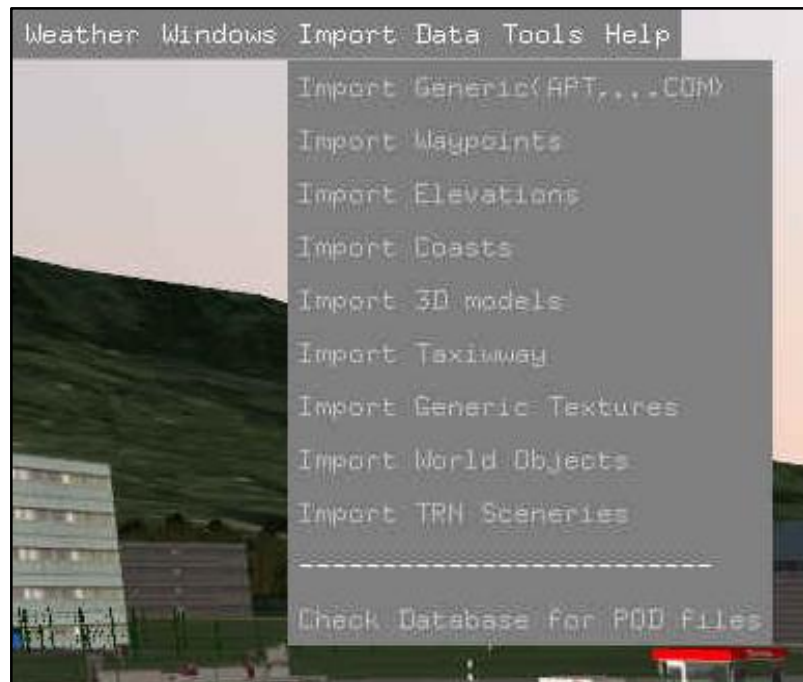
The menu «Tools»

«Subsystem probe» *= tool for the devellopers !*

> The «Subsystem probe» allows the develloper to observe the simulator parameters.
> The Fly! Legacy software contains several modules.
> Each module might contain a lot of parameters.
>
> Choose «Tools» -> «Subsystem probe»
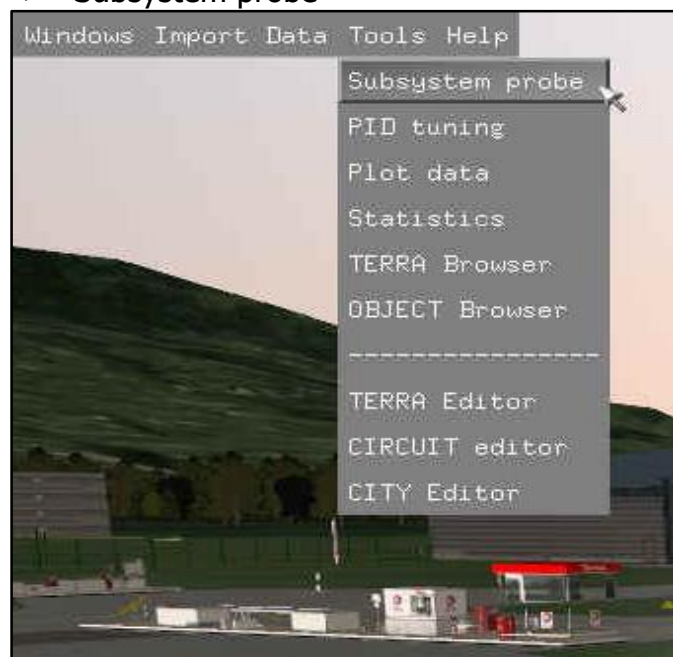
The window «SUBSYSTEM PROBE» appears:
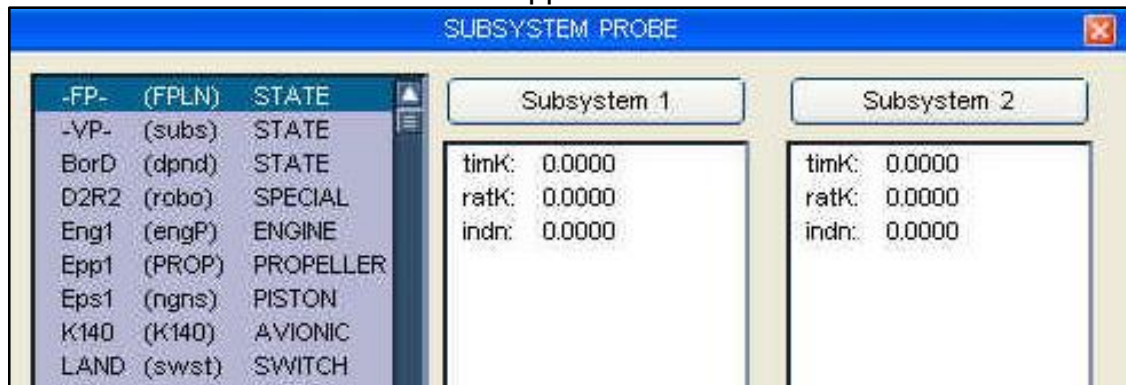
Assign a parameter (for example ENGINE Eng1 engP) to the «Subsystem 1»:
>   Mouse click on a parameter in the list. Then, click on the button «Subsystem 1»

Assign a parameter (for example PROPELLOR Epp1 PROP) to the «Subsystem 2»:
>   Mouse click on a parameter in the list. Then, click on the button «Subsystem 2»

We can observe two subsystems (Eng1 et Epp2) at the same time.
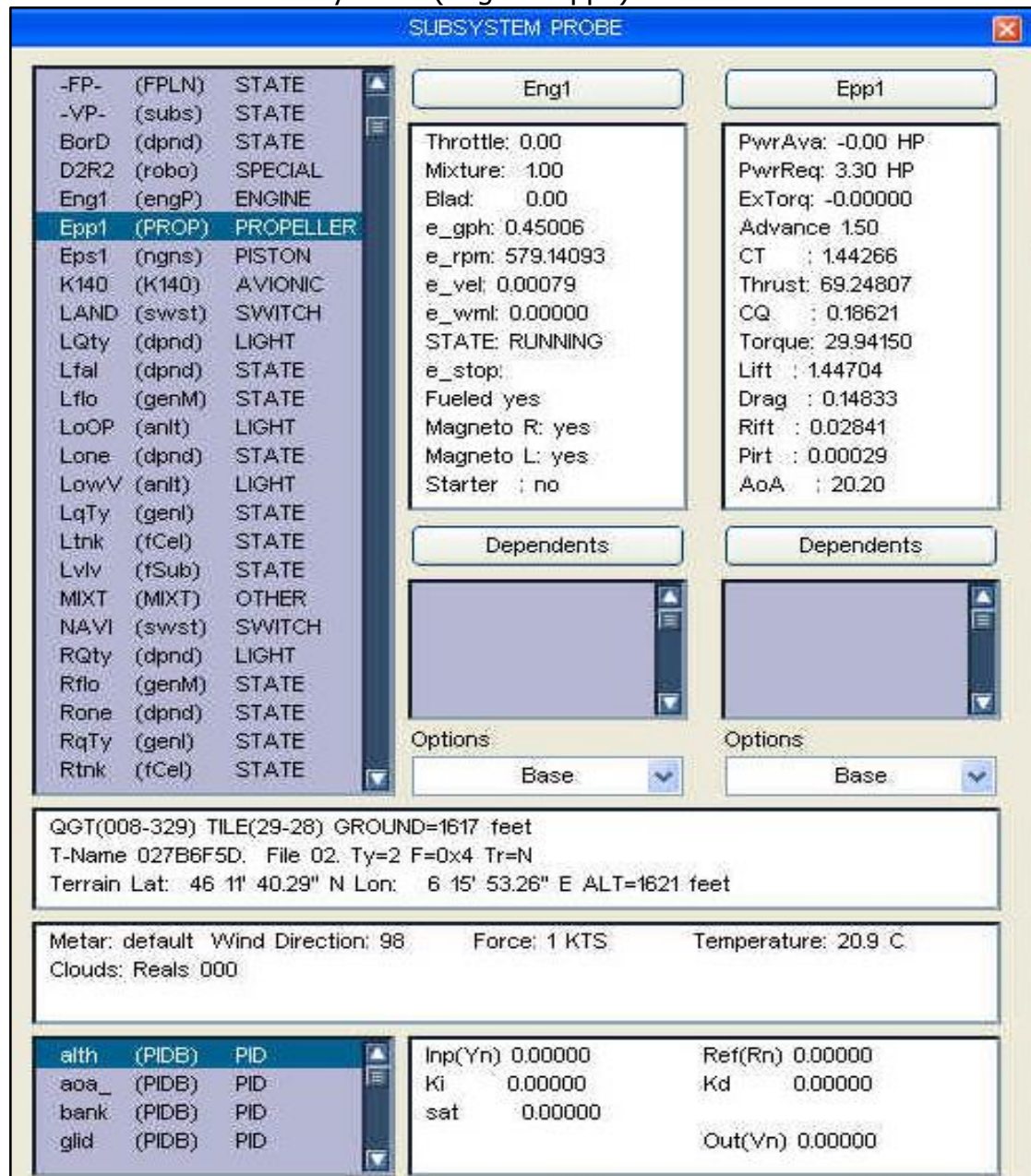
«PID tuning» tuning of autopilot behaviour *= tool for the developer !*

The autopilot behaviour depends mainly on the tuning of the PID (P= Proportional, I= Integrate, D= Differential) parameters of the software controllers.

Choose «Tools» -> «Sub-system probe»
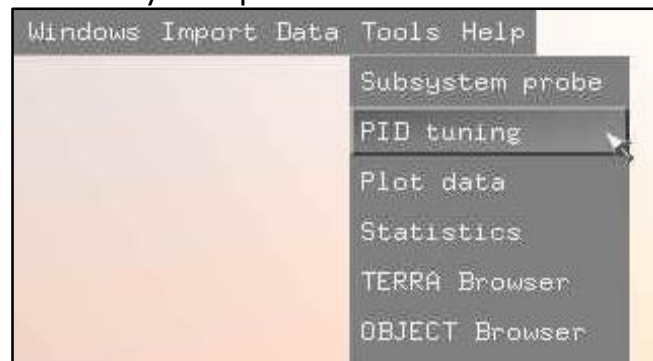
The window «PID TUNING» appears, and allows the developers to optimise the autopilot behaviour.
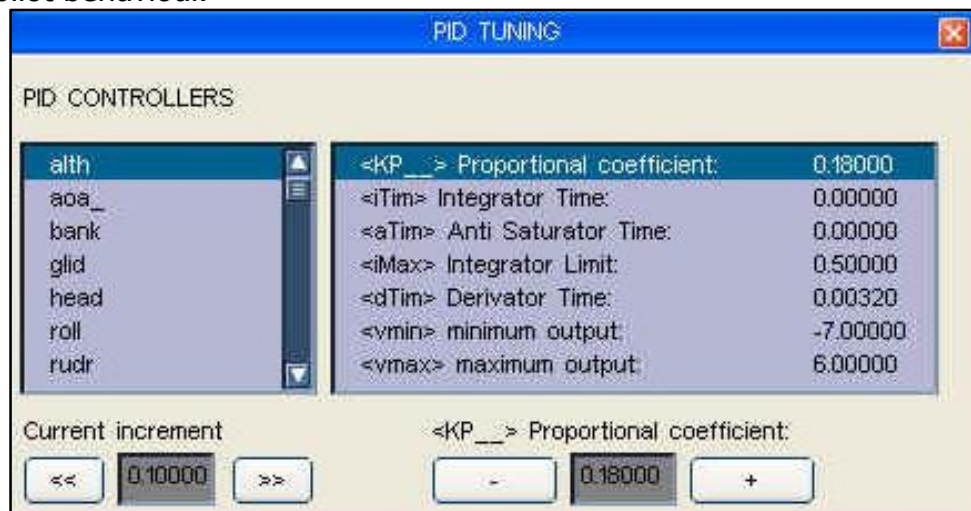
«Plot data»

The «Plot data» shows the parameter histogram graph.
Choose «Windows» -> «Toggle full screen»

The window «PLOTTER» appears.

We can observe two parameters at the same time.
Choose in the list «DATA to PLOT» the parameters to be monitored.
For example: «Eng1 air flow» and «Eng1 p-lift».

The buttons « + and − » allow us to adjust the scale of the graph.

«Statistics» (Statistics of the simulation)

The table «Statistics» shows a real time table containing simulation statistic data.

Choose «Windows» -> «Toggle full screen»
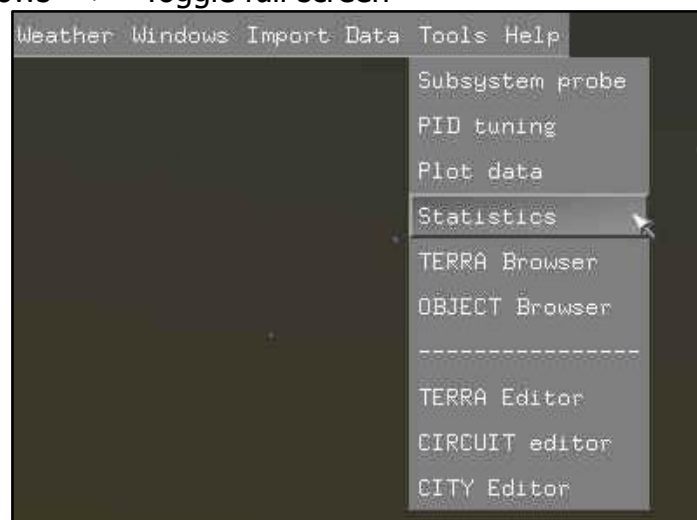
Mouse click on «Statistics».
The window «SYSTEM STATISTICS» shows real time statistic data

SYSTEM STATISTICS	
Total bitmap:	125
TERA Vertices:	219329
QGTs:	25
Coast slots:	37
Coast lines:	809
QGT draw:	11
Sup draw:	584
Terrain Shared Textures:	132
Terrain Day Tex OBJ:	4992
Terrain Nit Tex OBJ:	21
Object Shared Textures:	89
Object Texture Objets:	89
3D Objects:	1386
3D Drawed :	0
3D Models:	769
Tile Cache:	46
Airports:	302
Runways:	493
ILS:	99
VOR:	85
NDB:	83
COM:	488
WPT:	0
OSM objects:	6519

«TERRA Browser» (Terrain tile navigator)

In Fly! Legacy, the terrain contains several terrain tiles.
Each tile represents a certain type of terrain («Landclass»).
The «TERRA BROWSER» allows us to observe and exchange the terrain tiles.

Choose «Windows» -> «Toggle full screen»

Vehicle	Weather	Windows	Import	Data	Tools	Help

Subsystem probe
PID tuning
Plot data
Statistics
TERRA Browser
OBJECT Browser

TERRA Editor
CIRCUIT editor
CITY Editor

Click on "TERRA Browser": the window «TERRA BROWSER» appears.
The red rectangle represents the borders of the selected terrain tile.
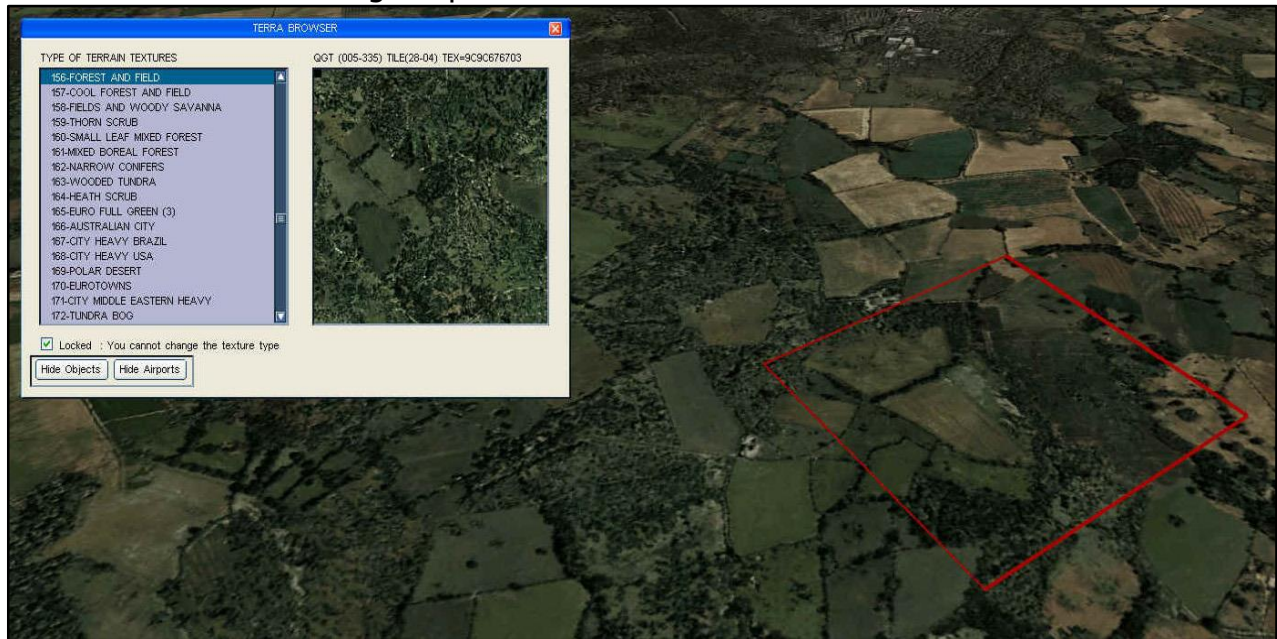
Mouse click on the button:
- «Hide Objects»: de-activate the display of 3D objects in the simulator.
- «Hide Airports»: de-activate the display of airports in the simulator.

To change a texture type:
- Position the aircraft at a desired location, by using SLEW mode.
  Consult *chapter 4: «Principal commands to use Fly! Legacy»*
  The red rectangle follows the aircraft movement.
- Mark «You may change the texture type» to allow access.
- Click on a choosen texture type from the list «TYPE OF TERRAIN TEXTURES».
- Confirm by mouse click on the button «Assign selected Texture».
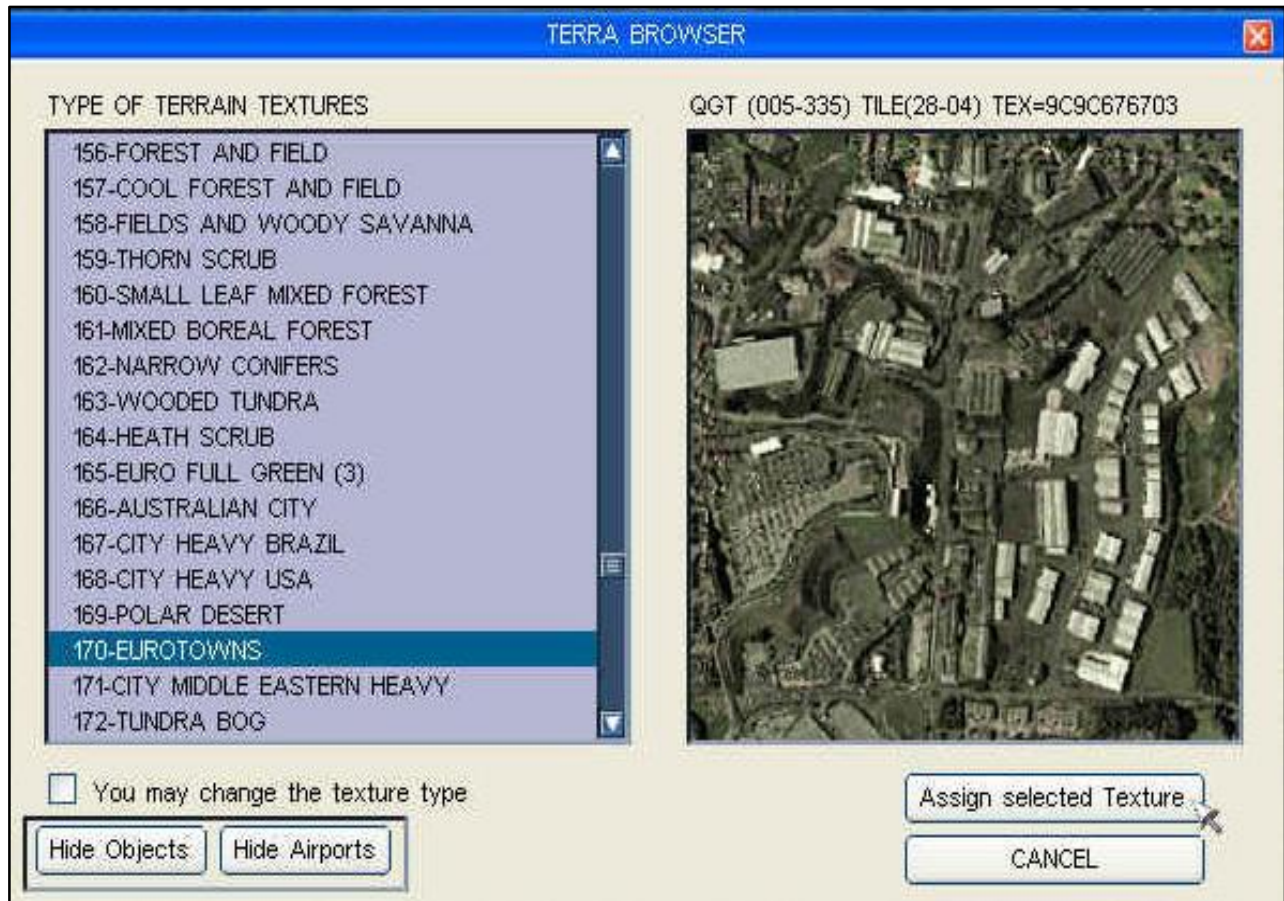
«OBJECT Browser» (3D object navigator)

The «Object Browser» allows us to display the 3D objects present in the scenery.
We select an object from an object list, and the navigator shows the 3D object info.

This tool is very useful during scenery development.

Choose «Tools» -> «OBJECT Browser»
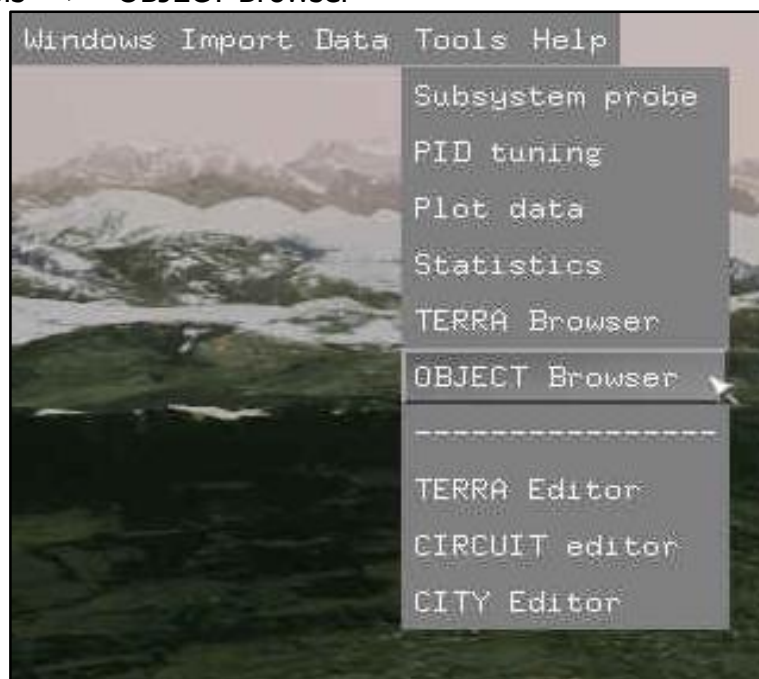
The window «3D-MODELS BROWSER» appears.
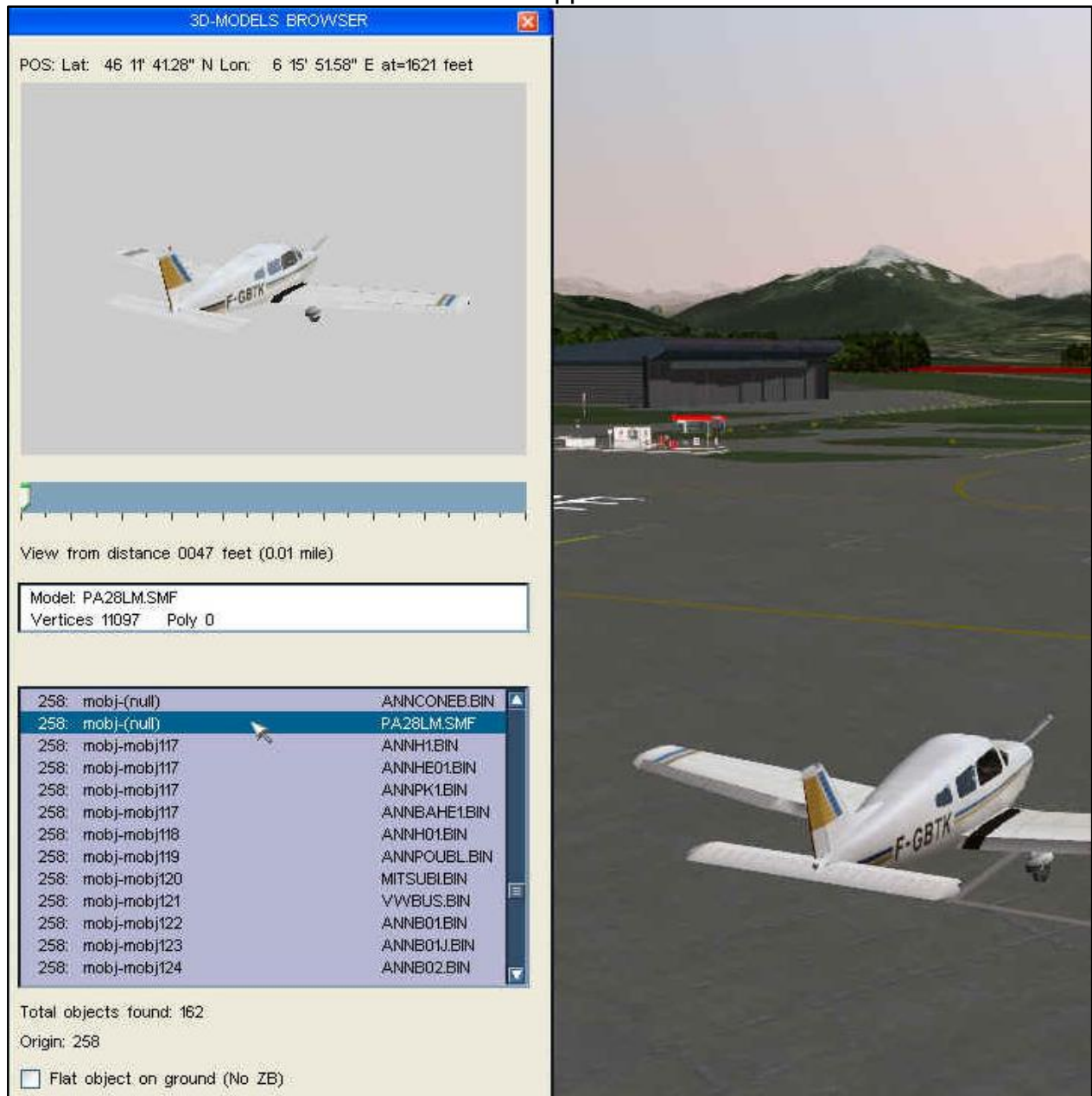
The list shows the 3D objects of the scenery around the aircraft.
Position the aircraft at a preferred location, by using the SLEW MODE.
Consult *chapter 4: «Principal commands to use Fly! Legacy»*

Mouse click on a 3D object from the list, to select that object.
The selected object:
- Appears in the viewer «3D-MODELS BROWSER» (Sustained click on the slider to change the zoom factor of the 3D object)
- Blinks, to facilitate the identification among other objects in the scenery
- Displays:
  - Name of the file: Model PA28LM.SMF
  - Number of «vertices»: 11097
  - Number of polygons.

Mark «Flat object on ground (No ZB)» to prevent the 3D object from floating in the air.
(No ZB = no «Z buffering» by the software)

An example of a selected 3D object.
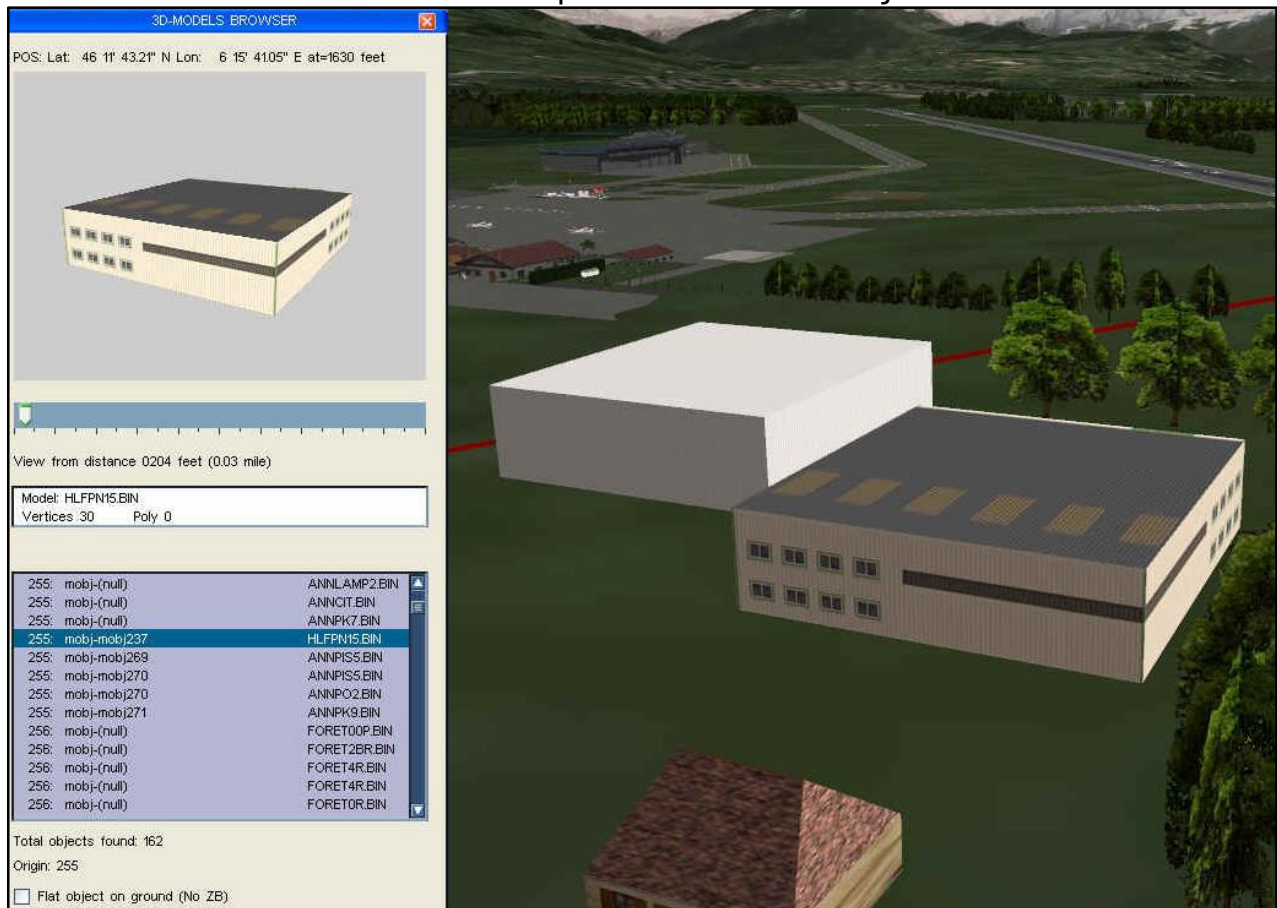
«TERRA Editor» (Terrain editor)

The «TERRA Editor» allows us to display and to edit the terrain profile around an aircraft. (For example: very useful to flatten the terrain at an airport)
The terrain elevation is defined into the DEM (Digital Elevation Map) files.
     In Fly! Legacy, each terrain tile contains several «nodes».
     An elevation height is assigned to each node.
«TERRA editor» allows us to visualise nodes and to edit the node elevation height.

Position the aircraft at a preferred location, by using the SLEW MODE.
Consult *chapter 4: «Principal commands to use Fly! Legacy»*

Choose «Tools» -> «TERRA Editor»

Blue cones represent each node of the selected terrain tile around the aircraft.
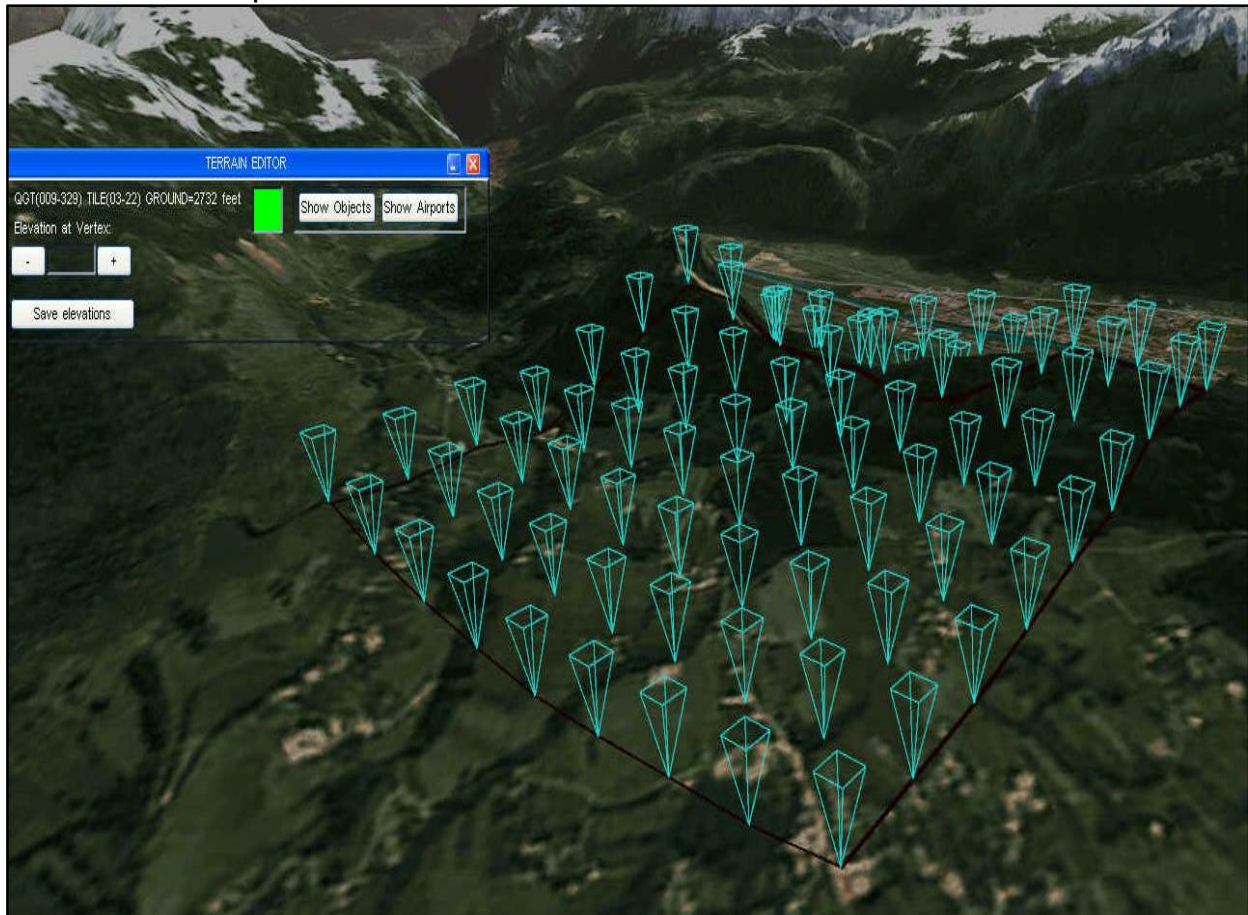
Also the window «TERRAIN EDITOR» appears.

Mouse click on the buttons:
- «Show Objects»: to visualise the objects in the scenery
- «Show Airports»: to visualise the airports in the scenery

Change a node elevation height:
- Mouse click on a blue node cone to be edited: the node cone becomes red. «Elevation at Vertex» displays the selected node elevation height.
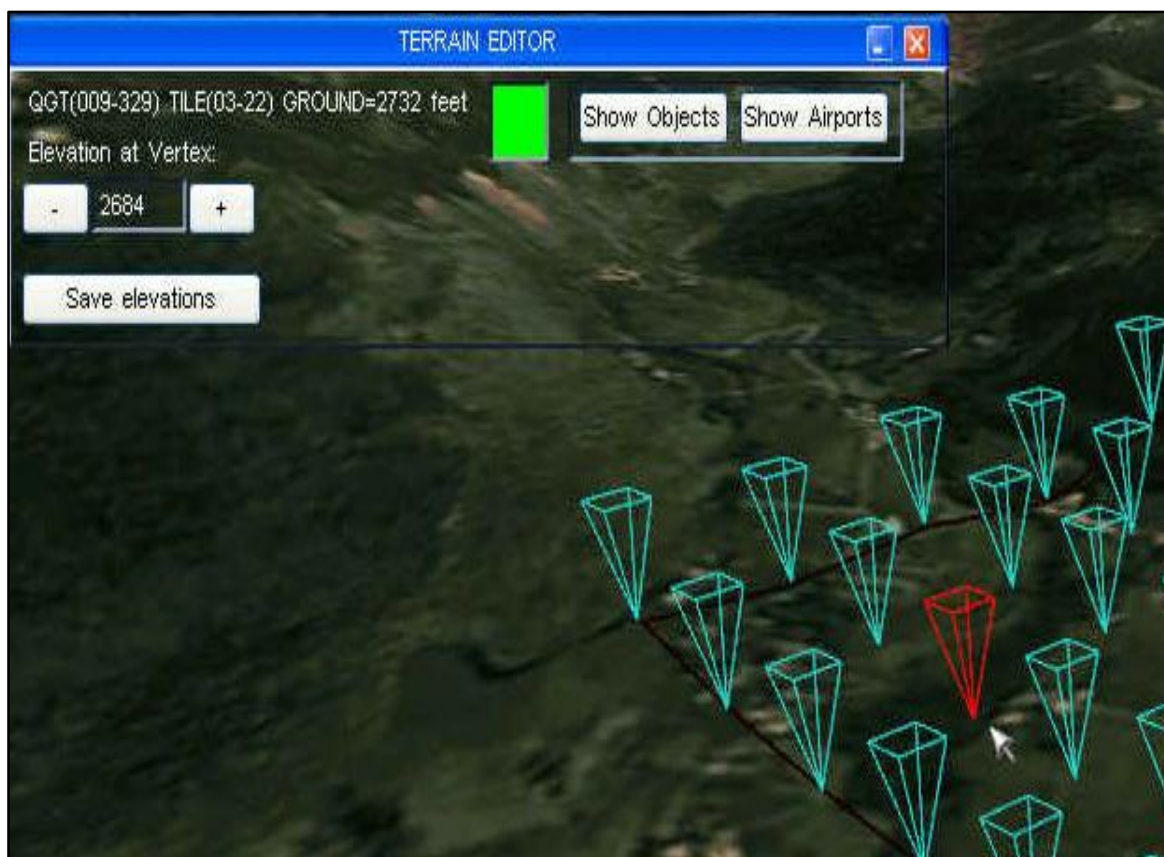
- Edit the node elevation height by mouse click on the buttons «+ or -» of «Elevation at Vertex»
- «Save elevations»: to save the edited node elevation heights.

«CIRCUIT editor»

The «CIRCUIT editor» allows us to display and to edit a programmed ground circuit for aircraft. This circuit contains several «nodes», and allows autonomous taxing by the virtual pilot.

- From the hangar to the departure runway holding point.
- From the landing runway exit to the hangar.
-

A detailed guide is available in the Fly! Legacy sub-directory «Doc».
Consult the document: «CircuitEditor.doc»

Choose «Tools» -> «CIRCUIT Editor»

The window «TAXIWAY EDITOR» appears.

Mark «Take-off Circuit»: to show the ground circuit towards the departure runway .
Mark «Landing Circuit»: to show the ground circuit after landing.

Mouse click on the buttons:
«Test circuit»: test the paths of the circuit. Error report available in the file TRACE.log
  (See FlyLegacy sub-directory «Logs»)
«Center»: center the circuit plan on the screen.
«Search path»: verify the path between start node and end node.

Example of a ground circuit after landing at the Annemasse airport.

The circuit is displayed by white lines.
The circuit nodes are displayed by coloured points (yellow, green, blue, red)

Node colour legend:
- Yellow   parking node.
- Blue   taxiway node.
- Green / Red   circuit node.

We are able to edit the nodes.

Mouse click on an existing node, to show a drop-down menu, at the click spot.
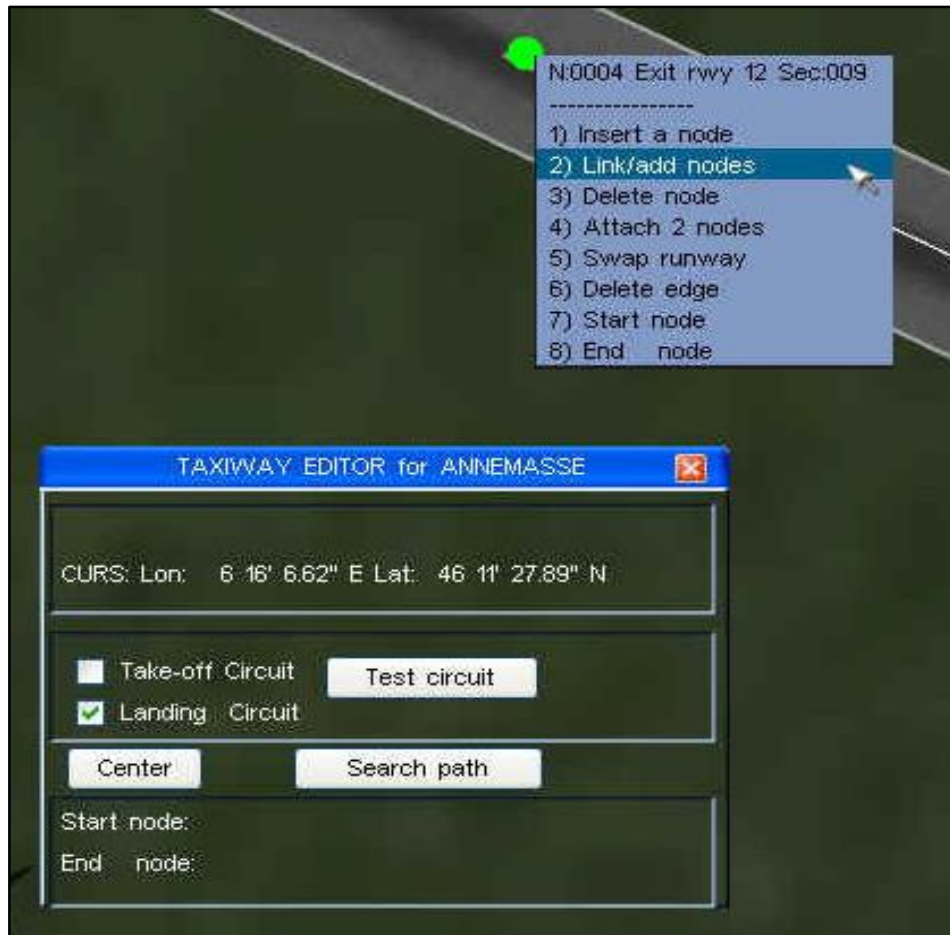
Several node editing options available:

- «Insert a node»   inset a new node
- «Link/add nodes»   connect/add nodes
- «Delete node»   remove a node
- «Attach 2 nodes»   attach two nodes to each other
- «Swap runway»   change runway
- «Delete» edge   delete a part of the circuit between 2 nodes
- «Start node»   start node of a circuit
- «End node»   final node of a circuit

Example: add 2 nodes into a circuit.

- Mouse click on an existing node: the drow down menu appears.
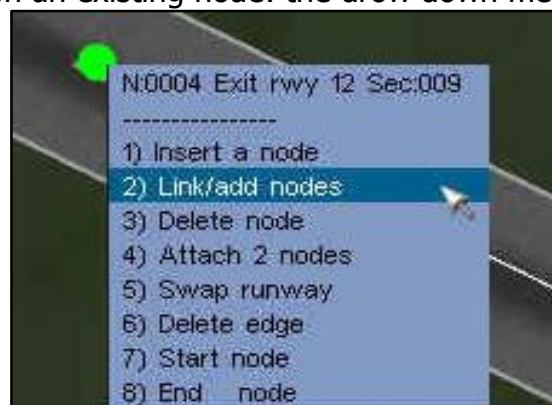
- Choose «Link/add nodes» and move the mouse to the location where we want to insert the new node.
  A white arrow appears and points towards the new node (yellow).
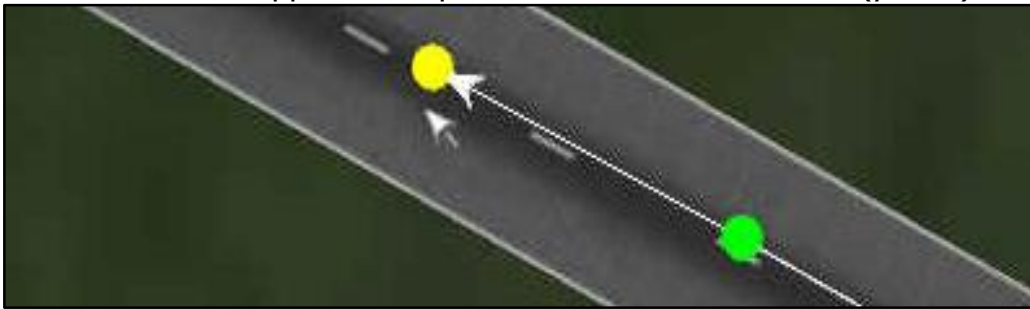
- Mouse click on the yellow node: the drow down menu appears.
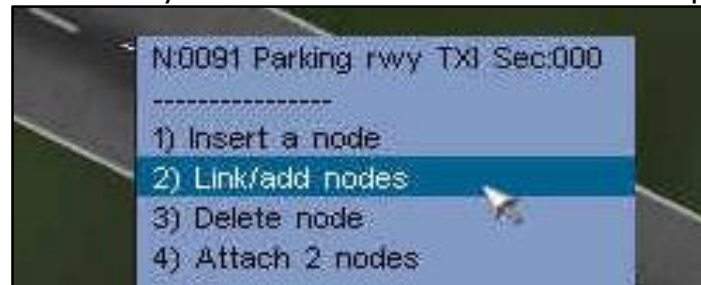
- Choose «Link/add nodes» and move the mouse to the location where we want to insert the second new node. A white arrow appears pointing to the new node (yellow). The previous node becomes blue.
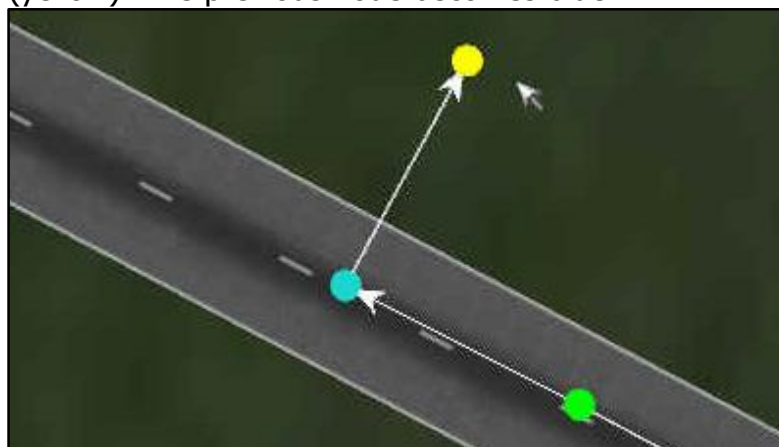
- Mouse click on the yellow node: the drow down menu appears.

«CITY Editor»

The «CITY Editor» is a performant tool, which allows us to generate complete cities or towns in a few minutes. Those cities or towns may contain thousands of 3D objects (houses, trees, …) based on data from the registry.

In this way, everyone might model her/his preferred city or town.

The site «Openstreetmap» provides the primary cartographic data used by the tool.

This site is accessible via: http://openstreetmap.fr/

Choose «Tools» -> «CIRCUIT Editor»

The window «CITY EDITOR» and «FILE SELECTION» appear.

A detailed «CITY Editor» guide is available:

The guide is available via the internet site of Fly! Legacy: http://fly.simvol.org/
      «Guide de démarrage rapide OpenStreetMap (english)»
      This guide explains all the steps needed to build and save a city or town.

Another technical user manuel is also available in the FlyLegacy sub-directory «Doc»:
consult the document «FlyStreetUser.doc»

The «CITY Editor» is capable of generating about 20 objects a second !
The dimension and shape off each object correspond to the real wold object.
Each object is located at the exact location as in the real wold.

The «CITY Editor» allows us to save the 3D objects in an SQL database, in order to
obtain permanent scenery.

Observe the result in the picture below: Chambéry generated by the «CITY Editor»

(Sceen capture of Fly! Legacy)

The menu «Help»

«About ... »

Choose «Help» -> «About ...»

A window «ABOUT FlyLegacy» appears. The version of Fly! Legacy is indicated.

The «info bar» function

Press the keyboard "TAB" key to display the info-bar.

- «Alt»   the aircraft altitude (feet).
- «AGL»   (Above Ground Level) elevation of the aircraft above ground (ft).
- «Speed»   the aircraft speed (knots).
- «VSI »   (Vertical Speed Indication) the vertical speed of the aircraft (fpm).
- «CAP »   the aircraft cap (degree)
- «PITCH»   the aircraft pitch (degree)
- «FPS»   (Frames Per Second) simulation screen frame rate per second.

Chapter 9

The Cessna 172SP in Fly! Legacy

Chapter 9: the Cessna 172SP in Fly! Legacy

The main instrument panel

The 6 main flight instruments are located at the center of the instrument panel, just under the eyes of the pilot. In flight, you will constantly have to check those 6 instruments to fly safely.

Airspeed indicator.

The airplane speed, in relation to air, is measured with a little external tube: the pitot tube. It is calibrated in miles per hour or knots (1 knot = 1852 meters per hour).

Green arc: this is the normal and safe operating range of the airplane.
Yellow arc (caution range): fly within this range only in smooth air, and then, only with caution.
Red line (never exceed speed): operating above this speed is prohibited since it may result in damage or structural failure and lose of control.

White arc: this arc is commonly referred to as the flap and landing gear (when retractable) operating range. Approaches and landings are usually flown at speeds within the white arc.

Artificial horizon or attitude indicator.

This instrument gives you the airplane position in relation to roll axis (right/left) and pitch axis (dive/climb).

It shows if you are in horizontal flight and/or in turn.

The brown area represents the ground, and the blue area represents the sky.

Altimeter Measures the airplane altitude above a given pressure level (generally sea level).

It operates with air pressure, based on the sea level pressure.

So if you take off from an in altitude airfield, you must correct the reference pressure, thanks to adjustment knob, to show the local pressure. Otherwise the altitude of the airplane will not be correct. In flight, it will be necessary to adjust the reference pressure according to weather conditions.

Little pointer is the 1,000 ft pointer, and the big one is the 100 ft pointer. So for 1,500 ft (about 500 m), the little pointer shows 1 and the big pointer shows 5.

Turn coordinator (ball-needle)

This instrument shows if the airplane is turning, as does the artificial horizon. In addition it shows the turn rate.

A ball shows if the airplane is slipping or skidding.

If the ball remains centered in the tube, the airplane does not slip or skid.

In order to avoid slipping, you will press the rudder pedal.

Use the simple rule, "step on the ball," to remember which rudder pedal to press.

Heading indicator or directional gyro = This instrument indicates heading.

It does not use magnetic field. So it is necessary to periodically calibrate it by comparison with the magnetic compass located at the windshield. The setting is done with the left bottom adjustment knob (use the mouse). The right adjustment button allows to move a pinnule. For example, we fly to a course of 175° and we have to turn for a course of 90°.

In advance we move the pinnule on "E" (=90), then we can engage the autopilot (HDG mode) to change the course.

The autopilot aligns the airplane with the course indicated by the pinnule.

Vertical speed indicator

This instrument indicates whether the airplane is climbing, descending, or in level flight.

The rate of climb or descent is indicated in feet x 100 per minute.

Digital screen / watch

Button «OAT / VOLTS»:

OAT «Outside Air Temperature» in degree Celsius or Fahrenheit

VOLTS: electric tension of the aircraft battery.

Button «SELECT»:
- UT « Universal Time »   universal time referred to the Greenwich meridian
- LT « Local Time »   local time
- FT « Flight Time »   total flight time
- ET « Elapsed Time »   elapsed time since start chrono.

Button «CONTROL»:   start / stop the chrono.

FUEL QTY

Fuel quantity in the fuel tanks of the aircraft: in US Gallons.

LEFT: left wing fuel tank

RIGHT: right wing fuel tank

EGT and FUEL FLOW

EGT «Exhaust Gas Temperature»

25° F/DIV: 25 degree Fahrenheit per division.

The pinulle (black colour) allows adjustment of the bug (red needle) via left/right mouse clicks.

FUEL FLOW: fuel flow consumed by engine in GAL/HR (Gallons per hour)

OIL

OIL TEMP: engine oil temperature

°F: degree Fahrenheit

OIL PRESS: oil pressure of the engine

PSI: Pound per Square Inch

VAC and AMP

VAC «Vacuum»: the vacuum of the system.

Measures the air vacuum created by the vacuum pump, which drives the gyros.

AMP «Ampere»: the electic current.

+: battery is charging

- : electric consumption

The magnetic compas.

Indicates the magnetic nord.

Useful during calibration of the gyrocompas, under the condition that the aircraft flies stable: no turns or no acceleration / deceleration.

In reality, it can even be necessary to re-calibrate this instrument when on ground.

Alert-warning display:
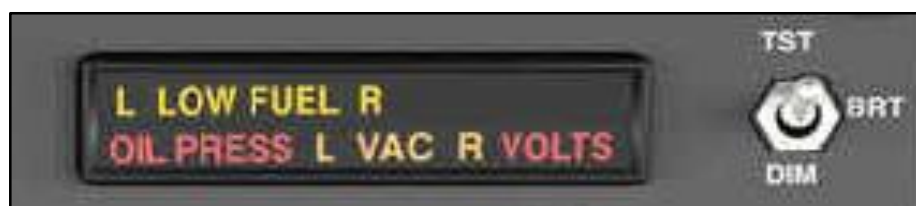
- «L LOW FUEL R» insufficient fuel quantity available in the fuel tanks (L) and/or (R)
- «OIL PRESS» insufficient engine oil pressue.
- «L VAC R» insufficient vacuum of the (L) and/or systems.

- «VOLTS» insufficient electric tension.

The switch:

- «TST (Test)» test of the alert indicators
- «BRT (Bright)» more brightness of the alerts
- «DIM (Dimmed)» less brightness of the alerts.

The electric current fuses.

The fuses are not operational in Fly! Legacy (version 1.2.7).

KR87: digital ADF «Automatic Direction Finder»

NDB «Non Directional Beacon»

The NDB beacon emits a non-directional signal, suitable for aereal navigation.

The Vector Map allows us to display the aircraft position related to the NDB beacon.

The selector ADF (black colour) allows us to select the frequency of the NDB beacon.

The NDB frequencies (active and standby) are displayed on the screen of the KR87.

The button «FRQ/<->»: allows us to transfer between active and standby frequency.

A detailed guide of the KR87 is available in the Fly! Legacy sub-directory «Doc».

Consult the document «Kr87.pdf».

- *The ADF instrument (Automatic Direction Finder):*

The ADF needle is always pointing to the received NDB (Non Directional Beacon) selected on the ADF: KR87.

«OBS «Omni Bearing Selector»:

Allows us to change the indicated cap.

The adjustment is done by the mouse click.

The example below shows a « North » cap on top of the ADF.

Example: the aircraft is flying inbound (towards) the NDB «GLA Gland»

The ADF needle points towards the top of the instrument.

Example: the aircraft is flying outbound (away from) the NDB «GLA Gland»

The ADF needle points towards the bottom of the instrument.

KX155: VHF Communication / Navigation Transceivers.

- The Cessna has two KX155.

- o Button «PULL TEST / OFF»: mouse click to connect / deconnect the KX155.
- o The KX155 contains the COM radio for communication, and the NAV receiver for navigation.
- o A detailed guide of the KX155 is available in the FlyLegacy sub-directory «Doc». Consult the document «Kx155.pdf»

- The VHF communication systems: COM1 and COM2

The selector (black knob): select the COM frequency for radio communication.

The COM frequencies (active and standby) are displayed on the KX155 screen.

Example: 118.95 Mhz active frequency and 125.00 Mhz standby frequency.

The button «<->»: transfert between standby and active frequencies.

Le button «CHAN» (channel):

The KX155 is able to memorize at maximum 32 COM frequencies.

Mouse click on «CHAN»: the active channel «01 CH» appears.

Second click on «CHAN»: we enter the programming mode «01 PG».

Mouse click on button <->: the standby frequency is blinking on the display, and we can change that frequency by mouse clicks directly on the sceen digit.

We can apply the same procedure for the other channels.

Mouse click on «CHAN»: the active channel «01 CH» appears.

Mouse click on the selector (black knob): the channel «02 CH» appears.

- The NAV navigation systems: NAV1 and NAV2

VOR «VHF Omni-directional Range»

The VOR emits an omni-directional signal suitable for aereal navigation.

The Vector Map allows us to display the aircraft position related to the VOR.

Example: VOR GVA (Geneva) and VOR PAS (Passeiry)

The selector (black knob): allows us to select a VOR frequency.

The VOR frequencies (active and standby) are displayed on the KX155 screen.

Example: 114.60 Mhz active frequency of the VOR GVA (Geneva)

116.60 Mhz standby frequency of the VOR PAS (Passeiry)

The button «<->»:   transfert between standby and active frequencies.

The button MODE allows us to select different modes of the KX155.

- o The KX155 in normal mode: displays the VOR active et standby frequencies.

- o   Press the button «MODE»

    A FLAG indicator appears if the received VOR signal is too weak.

    Button <->: transfer between format «FLAG» and format «CDI».

    CDI = Course Deviation Indicator

- o   Press the button «MODE»

    A «TO» indication appears, together with the inbound course towards the VOR.

- o   Press the button «MODE»

    A «FROM» indication appears.

○ Press the button «MODE»

An «ET» (Elapsed Time) indication appears, together with the time.

Button <-> (Transfert): to start / stop the chrono.

- *Instrument NAV1 and NAV2.*

The Cessna has two NAV instruments, to be able to show two VOR at the same time.
Example: NAV1

Button «OBS (Omni Bearing Selector)» allows us to select a radial according which we want to approach the VOR.

The radial selection occurs via the mouse.

The white triangle «NAV»:

   Triangle pointing upward: aircraft flies inbound TO the VOR.
   Triangle pointing downward: aircraft flies outbound away FROM the VOR.

The needle CDI (Course Deviation Indicator) represents the selected radial via OBS.

Example: VOR GVA (Geneva) on NAV1.

The aircraft is situated lefthand of the radial 300°.

Example: VOR GVA (Geneva) on NAV1.

The aircraft is situated righthand of the radial 300°.
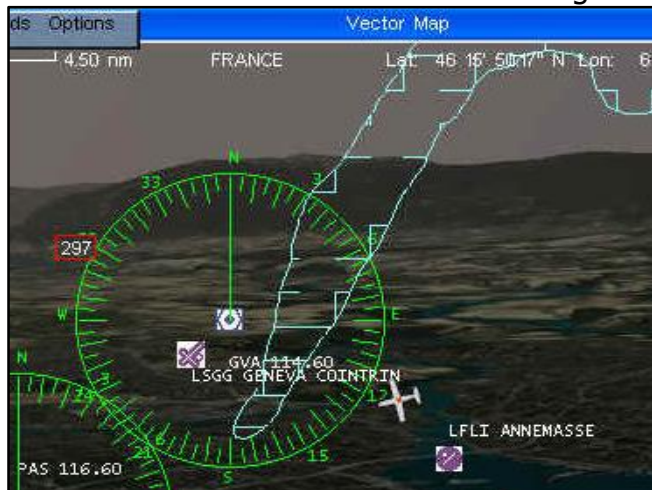
The needle «GS (Glide Slope)» represents the glide slope of the ILS (Instrument Landing System) approach.

If the flag «GS» shows red/blue colour: the «glideslope» is inactive.

- _ILS (Instrument Landing System) approach._

  The ILS system allows a radio navigation approch.

  The ILS system contains two emittors.

  - o «Glideslope»: radio antennas located at the beginning of the landing runway, abeam the large white rectangles located after the landing runway ID number.

    Those antennas send a radio signal which is oriented according the glide slope.

    (For example 3 degree = 5%).

    Fly! Legacy can visualise the glideslope.

    o «Localiser»: radio antennas located at the end of the landing runway.

Those antennas emit a radio signal oriented according the runway axe.

The ILS antennas and receivers (of the aircraft in approach) are able to pick up the ILS «Glideslope» and «Localiser» signals.

Each ILS system has an ILS frequency which is specific for the landing runway.

The KX155 (Navigation Transceiver) is able to receive the ILS frequency and to process Glideslope» et «Localiser» information towards the NAV1 instrument.

Example: ILS approach towards runway 18R at airport Chambéry.

Enter the ILS frequency of runway 18R into the KX155:   active freq. 109.50 Mhz.

As the aircraft is approaching the Chambéry airport, the ILS signals are received by the transceiver NAV1, and the ILS becomes active.

The example below shows the aircraft during approach:

- o   Still under the «Glideslope»

- o   Lefthand of the «Localiser» and ready to intercept «Localiser».

The aircraft is situated above the «glideslope»

and the «localiser» interception has already occured.

ILS final appoach by the aircraft:

- o Slightly above the glidepath: the «glideslope» needle is slightly below the center on the NAV1 instrument.
- o On the axe of runway 18R: the «localiser CDI» is centred.

KAP140: the autopilot

- *Overview of the autopilot KAP140*

The autopilot KAP140 assures an automatic guidance according two aircraft axes.

«Roll axe»: guidance according the roll axe, in several modes:
  - «Wing leveler» horizontal stabilisation of aircraft main wings.
  - «Heading select» select and maintain the aircraft course.
  - «VOR/LOC» interception and VOR ou LOCALISER following.
  - «GPS coupled» autopilot connected to the GPS.

«Pitch axe» guidance according the pitch axe, in several modes:
  - «Altitude hold» maintain the aircraft altitude.
  - «Altitude preselect» preselection of the desired aircraft altitude.
  - «Vertical speed» vertical speed of the aircraft.
  - «Glideslope» the vertical guidance signal of the ILS (Instrument Landing System)

Button «AP»: mouse click to swith on/off the autopilot.

A detailed guide of the Kap140 is available in the FlyLegacy sub-directory «Doc». Consult the document «Kap140.pdf».

Navigation in «ROL» (Wing Leveler) mode

In «ROL» mode, the autopilot compensates the roll of the aircraft main wings, in order to assure a horizontal stabilzation.

Mouse click on the button «HDG» to toggle the autopilot between «ROL» mode and «HDG» mode.

- *Navigation in «HDG» (Heading) mode*

Mouse click on the button «HDG» to toggle the autopilot between «ROL» mode and «HDG» mode. In «HDG» mode, the autopilot follows the HDG setpoint of the gyro.

For example, we fly the cap 175° and we need to turn towards 90°.

In advance we set the pinnule of the gyro on 90°, and we can engage the autopilotot in «HDG» mode to start the turn. The autopilot will now turn the aircraft towards the 90° setpoint.

Remark:

Mouse click on the button «REV» (Reverse) allows navigation in the opposite sense.

- *Navigation in «VOR/LOC» mode: interception and tracking of VOR or of LOCALISER.*

Example: interception and tracking of the 256° radial towards the VOR of Passeiry.

Frequency of the VOR PAS: 116.60

We set the «OBS (Omni Bearing Selector)» knob of NAV1 to 256 degree (=the radial according which we want to approach the VOR).

The CDI (Course Deviation Indicator) needle represents the radial selected via OBS.

Mouse click on the button «NAV»: the autopilot steers the aircraft towards the 256° radial of the VOR «PAS». Next, the autopilot will track that radial.

- *Navigation in «GPS coupled» mode: autopilot connected to the GPS.*
  Allows the autopilot to execute a flightplan in NAV GPS mode.
  In advance, we need an flightplan in the GPS: for example ANNEMASSE – ANNECY.

The GPS, in FLP (Flight Plan) mode, shows the active flightplan.

Mouse click on the button «NAV GPS» on top of the instrument panel.

Button «NAV GPS»: activation of the flightplan in the GPS.

The autopilot follows the active flightplan.

Remarque: clic souris sur le bouton «GPS APR» en haut du tableau de bord.

Button «GPS APR»: connects the autopilot to the GPS, and permits to fly via the autopilot an ILS approch towards the runway.

- *Navigation in «ALT» (Altitude hold) mode.*

Mouse click on the button «ALT» of the autopilot KAP140.

The autopilot enters in «ALT» mode, and holds the aircraft altitude.

- *Navigation in «Altitude preselect» mode:*   présélection de l'altitude de l'avion.

Mouse click on the selector (black knob) of the KAP140, to preselect an altitude.

For example «05000»: we'd like to descend towards an altitude of 5000 feet.

Mouse click on the button «ARM» on the autopilot, which enters the «VSP» mode. (Vertical Speed).

«VSP -600»: aircraft descends at 600 feet per minute, towards an altitude of 5000 ft.

Mouse click on the buttons «UP» or «DN» permits to adjust the vertical speed.

The result after the capture of the preselected altitude.

- *Navigation in «Vertical speed» mode.*

    Mouse click on the button «ALT» of the autopilot, which enters the «VSP» mode.

    Mouse click on the selector (black knob) of the KAP140, to preselect a vertical speed.

    For example «+400»: to climb at a vertical speed of 400 feet per minute.

    Mouse click on the buttons «UP» or «DN» permits to adjust the vertical speed.

For example «-600»: to descend at a vertical speed of 600 feet per minute..

- *Navigation in «APR (Approach)» mode. (ILS approach via autopilot)*

  The «APR» (approach) mode permits an ILS interception and tracking by the autopilot.   For exemple: an ILS approch towards runway 18R at Chambéry.

  ILS frequency runway 18R: 109.50

  Enter that frequency into the KX155.

  Steer the aircraft towards an initial approach point by applying a heading and an altitude which are suitable to intercept the ILS of runway 18R.

  NAV1:

  - o   The CDI (Course Deviation Indicator) needle represents the localizer of the ILS.

  - o   The «Glideslope» needle represents the glideslope of the ILS.

  Mouse click on the button «APR» of the autopilot KAP140.

  The autopilot enters in «APR ARM» (armed approach) mode, and is armed to intercept the ILS localiser and glideslope.

Example: «GS ARM» mode engaged, and the glideslope is active.

After localiser interception, the aircraft becomes established on the ILS of runway 18R.

KT76 «Transponder»

- *Mode «STB» (standby):*

   Mouse click on the selector (black knob) till «SBY» mode. The transponder enters in standby mode, and starts a warmup in order to assure a stable operation.

- *Mode «TST» (test):*

   Mouse click on the selector (black knob) till «TST» mode. The transponder enters in test mode.

- *Mode «ON»:*

  Click on the selector (black knob) till «ON». The transponder emits the code.

  Mouse click on the buttons « 0 – 7 »: to enter the transponder code.

  For example, code 7000 for VFR flights in europe.

  Mouse click on the button «VFR»: the transponder displays the code 1200

  (1200 = VFR code for the US)

  Mouse click on the button «CLR»: to clear the transponder code.

- *Mode «ALT» (altitude):*

  Mouse click on the selector (black knob) till «ALT». The transponder emits the
  transponder code, and also the actual flight level of the aircraft.

- *Button «IDT» (Ident):*

  Identification IDENT by transponder is not operational in Fly! Legacy (version 1.2.7).

- A detailed guide of the transponder KT76 is available in the Fly! Legacy sub-directory «Doc».   Consult the document «Kt76.pdf».

PMA7000: AUDIO panel

The audio panel is not operational yet in Fly! Legacy (version 1.2.7).

KNL89 «GPS navigation system»

- A detailed guide of KNL89 (GPS navigation system) is available in the Fly! Legacy sub-directory «Doc».   Consult the document «Kln89.pdf».

- *GPS startup sequence*

Mouse click on the button «PUSH ON BRT» to power on the GPS.
The GPS initiates a «self test».

After the test: 4 mouse clicks on the button «ENT» (Enter) to confirm the messages.

After confirmation, the airport page appears on the display.

- *Button «MSG» (Message)*

  Mouse click on the button «MSG»: GPS messages appear if available.

- *Button «OBS» (Omni Bearing Selector)*

  Mouse click on the button «OBS»: the selected NAV1 OBS course, is copied and displayed on the GPS. Example: OBS=060.

- *Button «ALT» (Altitude)*

  Mouse click on the button «ALT»: the local barometric pressure is displayed.

- *Button «NRST» (Nearest)*

    Mouse click on the button «NRST»:

    A selection screen allows us to choose between APT (airport) VOR or NDB.

    Selection of the nearest airport:

    The «APT» page has already been selected.   Mouse click on the button «ENT» to display detail information regarding to the nearest airport.

    Selection of the nearest VOR:

    From the selection screen, mouse click on the selector (black knob) to highlight «VOR?».

    Mouse click on the button «ENT»: details of the nearest VOR appear.

Mouse click on the button «ENT»: confirm VOR GVA.

Mouse click on the button «ENT»: navigation aid towards VOR GVA.

Selection of the nearest NDB:

From the selection screen, mouse click on the selector (black knob) to highlight «NDB?».

Mouse click on the button «ENT»: details of the nearest NDB appear.

- *Button «DCT» (Direct To)*

    Mouse click on the button «DCT»: the screen «Direct To» appears, and allows us to enter the ICAO code of the airport, VOR or NDB.

    To edit the code, mouse click donto the ICAO code on the GPS display.

    Example: the code «LFLI» of the airport Annemasse.

    Mouse click on the button «ENT»: navigation aid towards airport LFLI appears.

- *Button «CLR» (Clear)*

    Mouse click on the button «CLR» in order to clear the GPS entry.

- *Button «CRSR» (Cursor)*

    Mouse click on the button «CRSR» in order to activate the cursor, to allow data entry via the GPS display.

- *Page «APT» (Airport)*

  Mouse click on the label «APT»: the airport info page appears.

  Mouse clicks on the selector (black knob) to obtain additional airport info pages.

- *Page «VOR» (VHF Oriented Radio)*

    Mouse click on the label «VOR»: the VOR page appears.

    Mouse click on the selector (black knob) to obtain additional VOR info page.

- *Page «NDB» (Non Directional Beacon)*

    Mouse click on the label «NDB»: the NDB page appears.

    Mouse click on the selector (black knob) to obtain additional NDB info page.

- *Page «INT» (Intersection)*

    Mouse click on the label «INT»: the intersection page appears.

    Mouse click on the button «CRSR», in order to activate the cursor, to allow entry of the intersection code into the GPS display.

- *Page «USR» (User)*

    Mouse click on the label «USR»: the navigation data page appears.

- *Page «ACT» (Actual)*

    Mouse click on the label «ACT»: the navigation aid page appears.

    Example: without active navigation aid.

    Example: with active navigation aid (VOR GVA).

- *Page «NAV» (Navigation)*

  Mouse click on the label «NAV»:   the navigation aid page appears:

  - The ICAO code of the navigation aid: GVA (VOR de GVA)
  - The frequency of the navigation aid: 114.60 (VOR de GVA)
  - The name of the navigation aid: GENEVA COINTRIN
  - The distance towards the navigation aid: 6.5 nm
  - Le CDI (Course Deviation Indicator): to steer to the navigation aid
  - The direct course towards the navigation aid: DKT (Direct) 301°
  - The «track» towards the navigation aid: TK 151°

  Multiple mouse clicks on the selector (black knob) to obtain additional NAV related info pages.

- *Page «FPL» (Flight plan)*

  In advance, we need to have an active flightplan.

  For example: flightplan from Annemasse (LFLI) to Annecy Meythet (LFLP)

  Mouse click on the label «FPL»: the flightplan page appears.

  Multiple mouse clicks on the selector (black knob) to scroll through flightplan.

Mouse click on button «CRSR», in order to activate the cursor, to edit the plan.

- *Page «CAL» (Calculator)*

Mouse click on the label «CAL»: the calculator page appears.

Mouse click on button «CRSR», in order to activate the cursor.

Example: Wpt: Fr>GVA   (VOR GVA)

Mouse click on the selector (black knob) to display other calculator options.

- *Page «SET» (Setting)*

  Mouse click on the label «SET»: the «Setting» page of the GPS appears.

  Multiple mouse clicks on selector (black knob) to obtain additional info pages.

  - Setting of the time.

  - Setting of the database.

  - Setting of the autopilot: turn anticipation.

- Setting of the waypoint identification.

- Setting of the airport criteria.

- Setting of the SUA alerts.

- Setting of the units.

- ▪ Setting of the altitude alerts.

- ▪ Setting of the electric alerts.

- ▪ Setting of the GPS display.

- *Page «OTH» (Other)*

  Mouse click on the label «OTH»: the «Other» page of the GPS appears.

View of the Cessna pedestal

- **MAGNETOS: rotating key switch, which commands the aircraft magnetos.**

  - o   OFF: the electric current of the magnetos is switched off.
  - o   R «Right»: the righthand magneto is operational.
  - o   L «Left»: the lefthand magneto is operational.
  - o   BOTH: both magnetos are operational.
  - o   START: engine starting position.

  Directly after the engine start, the key returns by itself to «BOTH».

- **MASTER: twin interruptor switch (red colour)**

  MASTER BAT: interruptor switch battery current.

  MASTER ALT: interruptor switch alternator current.

- **Electric fuses FLAP / INST / AVN BUS1 / AVN BUS2 / TURN COORD / INST LT / ALT FLD / WARN**

  The electric fuses are not operational yet in Fly! Legacy version 1.2.7.

- **FUEL PUMP: interruptor fuel pump.**

  To operate a few seconds at engine start, to allow the fuel entering the cylinders.

  To operate during take-off and during landing, to assure fuel flow towards the engine.

- **LIGHTS: interruptors for the external aircraft lights.**

  - BCN «Beacon»: blinking white light located on top of the Cessna vertical tail.

    Activate to increase the aircraft visibility towards the other pilots.

  - LAND «Landing»: high beam landing light.

    To activate during take-off and during landing.

  - TAXI: light to activate during ground taxi.

  - NAV «Navigation»: navigation lights of the aircraft.

    (Red on the lefthand wing / Green on the righthand wing / White at the tail)

    To activate during startup and to extinguish before engine shutdown.

    Indicates the aircraft movement direction towards other pilots.

  - STROBE: blinking red light located on top of the Cessna vertical tail.

    To activate during startup preparation and to extinguish before battery shut-off.

- **PITOT HEAT**: **interruptor electric heath of pitot tube.**

  The pitot tube heating is required to avoid icing of tube leading to blocked tube.

The risc for icing occurs in case of cold and humid weather.

- **AVIONICS MASTER: main interruptor power supply to the avionics.**

    Interruptor «ON»: electric current supply towards the avionics.

    After obtaining radio ATIS and clearance, do not forget to shut-off the avionics master switch during the engine startup phase.

- **Rheostat lights.**
    - o «RADIO LT / PANEL LT»: radio light / panel light.
    - o «GLARESHIELD LT / PEDESTAL LT»: instrument panel light / pedestal light.

- **«THROT PUSH OPEN» (Throttle push open)**

    Push the throttle to open the gaz of the engine.

- **«MIX PULL LEAN» (Mixture Pull Lean)**

    Lever to adjust the richness of the mixture air-fuel towards the engine.

    Pull the lever, to decrease the richness of the mixture air-fuel (= Leaning).

    Verify if the exhaust gaz temperature remains normal.

    Consult the EGT (Exhaust Gaz Temperature) instrument.

    - During take-off at a high altitude airport, the air is thinner.

        We compensate this by reducing the richness of the mixture.

    - During cruise, reduce the mixture richness to decrease fuel consumption.

    During all departures and landings, the mixture lever need to be pushed completely forward, in order to obtain maximum enrichment of the mixture fuel-air.

    Exception: during departures or landings at very high altitude airports (e.g. the swiss airfield SAMEDAN situated at 5800 ft above sea level), we need to lean the mixture by gently pulling the mixture lever.

    In order to reduce the fuel consumption during cruise, we might gently pull the mixture lever to lean the mixture fuel-air.   If we reduce the mixture too much, the engine might misfire. Attention to the increasing exhaust gaz temperature. Monitor the EGT (Exhaust Gaz Tremperature) gauge.

- **«WING FLAPS»**

    At lower speeds, the flaps contribute to increase aircraft winglift.

    This is very useful during take-off and landing phase.
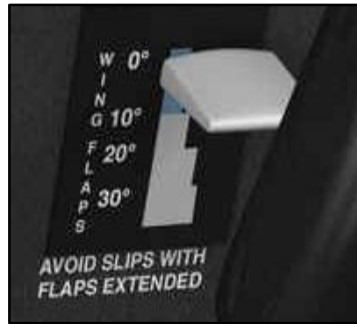
> Attention: extended flaps increase aircraft drag.
>
> Airspeed indicator: a white arc on the gauge indicates the speed range in which it is allowed to extend the flaps or the landing gear (if retractable).

- **Elevator TRIM wheel.**

  > During flight, the elevator trim allows the pilot to remove yoke pression to be applied
  > The «TAKE OFF» position:
  >> Rotate the trim wheel to put the elevator trim on the take-off position.
  >> The trim wheel can be assigned to a controller (yoke) or can be operated by mouse click on the trimwheel at the screen.
  >> The white line need to be aligned to the white triangle.

- **The «FUEL CUTOFF PULL» lever.**

  > Pull the lever to shutt-off the fluel supply towards the engine.
  >
  > For example: at the end of a flight after parking the aircraft, or in case of fire.

- **The «FUEL SELECTOR»**

  The two main fuel tanks are located in the lefthand and righthand wings of the Cessna.
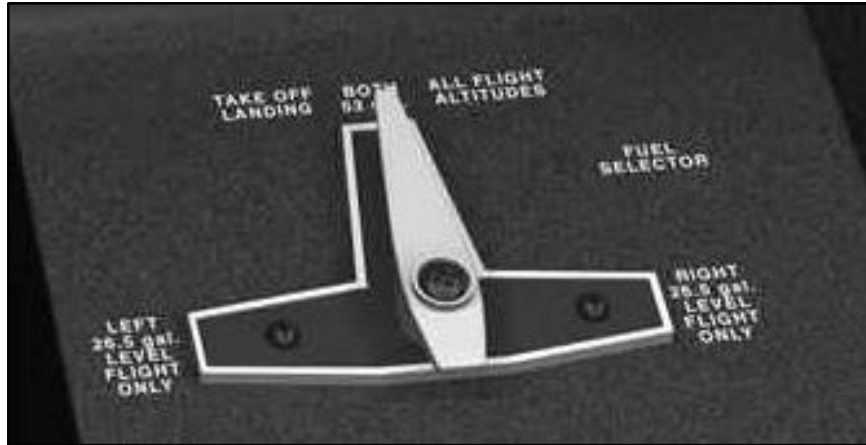
  The fuel selector has 3 positions:
    o «BOTH»: both fuel tanks deliver fuel towards the engine.

      Mandatory during take-off or during landing.
    o «LEFT»: only the lefthand fuel tank provides fuel towards the engine.

      Only allowed during stabilized flight.
    o «RIGHT»: only the righthand fuel tank provides fuel towards the engine.

      Only allowed during stabilized flight.

- **The RUDDER pedals**

  The Cessna rudder pedals operate the tail vertical rudder and also the differential wheel brakes.
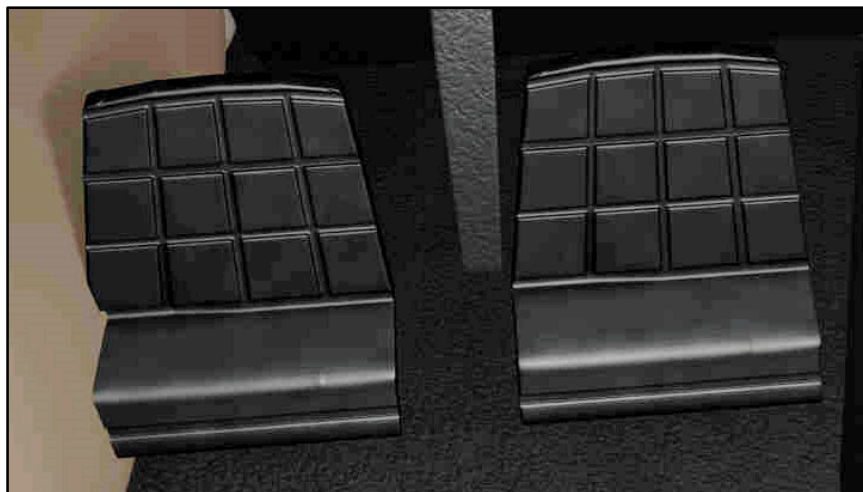
Chapter 10

Documents for Fly! Legacy (FlyLegacy.ini)

Document explaining the «FlyLegacy.ini» configuration file.

The document «Guide utilisateur.pdf» is available in the FlyLegacy sub-directory «Manuals».
This guide explains the file «FlyLegacy.ini» containing the configuration parameters.

The «FlyLegacy.ini» file contains many parameters to optimize Fly! Legacy, taking into account the characteristics of your computer hardware/software configuration.

Remarks when editing the «FlyLegacy.ini» file:
- o In advance, make a backup of the «FlyLegacy.ini» file, in order to save your parameters.
- o The syntax of the characters need to be correct, to avoid a corrupt «FlyLegacy.ini» file.

The «FlyLegacy.ini» file contains several sections:
For example:
- o Cloud related parameters.
- o Mouse related parameters.
- o Display related parameters.
- o Default weather: allows us to define a weather zone, applicable if no METAR report is available for the current airport.
- o Wind generator related parameters.
  Allows us to specify the different wind layers of the default weather zone.
- o Fysical parameters (engine, aeromodel)
- o Database directories.
- o Simulation related parameters.
- o Performance related parameters.
- o OSM (OpenStreetMap) related parameters.
  For example: OSM exclusion: to exclude the loading of certain object types.
- o UI (User Interface) section.
- o TRACE section: to activate tracing points which might help to clarify problems.

Document explaining the advanced usage of the autopilot.

Document «Guide utilisateur.pdf» is available in the Fly! Legacy sub-directory «Manuals».

Documents available in the Fly! Legacy sub-directory «Doc»

- ***Documents providing detail explanation of the Cessna avionic systems:***
    - Kap140.pdf: guide for the autopilot system.
    - Knl89.pdf: GPS navigation system.
    - Kr87.pdf: numeric ADF (Automatic Direction Finder)
    - Kt76.pdf: the transponder.
    - Kx155.pdf: VHF communication / navigation radios.

- ***Legacy FAQ.doc***

    This document provides explanation concerning some characteristics of Fly! Legacy.

- ***CircuitEditor.doc***

    The "Circuit editor" allows the construction of ground taxi circuits, which can be used by the virtual pilot, and in the future also intended to control multiple aircraft.

- ***FlyLegacyTuning.doc***

    This document explains the wheel braking system and also the aircraft steering.

Document available in the Fly! Legacy sub-directory «OpenStreet»

- ***FlyStreetUser_v6.doc (version 6)***
    The aim is to provide the Fly! Legacy users a series of tools suited to generate complete villages or cities, based on the registry information.
    In this way, everyone can build his/her own preferred scenery.

Fly! Legacy related documents available via the internet.
    Consult the Fly.Simvol internet site: http://fly.simvol.org/

Chapter 11

Questions and Answers (Q&A)

Where to find the Fly! Legacy manuel ?

Open the "FlyLegacy" directory: find the manual in the sub-directory «Manuals».

Is Fly! Legacy stand-alone, or do we need to install Fly! II in advance?

Fly! Legacy is completely stand-alone, so no need to have Fly! II installed.
- Most of the 2D scenery of Fly! II can be used in Fly! Legacy.
- The aircraft of Fly! II are unfortunately not compatible.
- The scenery and aircraft of Fly! ou Fly!2K are not compatible.

Is it possible to install Fly! Legacy on another drive ?

If Fly! Legacy has not been installed on the default location (C:\FlyLegacy), it is mandatory to change the paths of the SQL databases in the "FlyLegacy.ini" configuration file.
In the FlyLegacy sub-directory «System»: verify if the SQL section of the "FlyLegacy.ini" file contains the correct paths. (By default the paths are pointing towards C:\FlyLegacy.

I have installed Fly! Legacy, but I cannot access the menu-bar ?

In Fly! Legacy, press the keyboard spacebar, and the menu-bar will appear in Fly! Legacy.

I installed a new version of Fly! Legacy, in the same directory as the previous install. At startup an error message "Run Time error ..." occurs. How to proceed ?

Try a complete un-install of Fly! Legacy from the computer, then re-install the new version.

Fly! Legacy hangs during startup plante au lancement. How to proceed ?

During the Fly! Legacy startup, wait long enough till the complete loading of the scenery has finished, before touching any keyboard button or mouse.

How to assign controllers (joystick, yoke, rudder pedals, ...) ?

Refer to this Fly! Legacy User guide:
      Chapter 2: assign axes to controller (joystick)

      Chapter 3: assign actions to the different controller buttons

Computers with Nvidia video card:
- **How to avoid a blinking startup screen during the Fly! Legacy startup ?**
- **How to avoid «wireframes» being visible on textures**
  (For example in external view on the Cessna) ?

In the windows "Nvidia control panel" global settings:
      Antialiasing mode: select "Override any application setting" to solve the problem.

Computers with Nvidia video card:
Is it possible to increase the frame rate via a specific confiugation of the Nvidia video card ?

In case of Nvidia graphic cards, it is possible to increase the framerate via fine-tuning of the parameters in the "FlyLegacy.ini" file, located in the sub-directory «System» of Fly! Legacy.
In the section [Performances] put the value 1 instead of 0 for:

```
[Performances]
UsePlaneVBO=1           // Use VBO for aircraft model
UseTerrainVBO=1         // Use VBO for terrain
```

Computers with ATI video card:
Fly! Legacy does not function because the mousepointer is nearly frozen on the screen. How to proceed ?

Open the "FlyLegacy.ini" file, located in the sub-directory «System» of Fly! Legacy.
In the section [Performances] put the value 0 instead of 1 for:

```
[Performances]
UsePlaneVBO=0           // Use VBO for aircraft model
UseTerrainVBO=0         // Use VBO for terrain
```

Explanation: both parameters create buffers for the object and terrain elevation points.
On some graphic cards, even with RAM = 512 MB, the graphic memory gets saturated, causing the freeze.

In Fly! Legacy, where is the Cessna magneto switch (to start the engine) located?

In Fly! Legacy, the Cessna instrument panel is split-up in several panels.
Use the keyboard keys "Control + arrow" to view the panels
The magneto swith is located at the bottom of the instrumentpanel: "Ctrl + down arrow".
Press a 2nd time "Ctrl + down arrow" to view the pedestal panel containing the trim wheel.
Use "Ctrl + Up arrow" to return upward.
Use "Ctrl + Left arrow" or "Ctrl + right arrow" to view the left-/ righthand side of the panel.

I am able to apply throttle (with the mouse), but once full throttle applied it is impossible to reduce the throttle ?

Even if in theory it should be possible to pilot with keyboard and mouse, in practice it is neary not feasable. It is strongly recommended to use a controller (joystick or yoke).
Only then, the throttle (and aircraft airfoils) can be operated in a correct way.

How to activate the weather in Fly! Legacy ?

By default the weather is de-activated.
To activate, we need to open the "FlyLegacy.ini" file, located in the sub-directory «System» of Fly! Legacy. And put **NoMeteo=0** instaed of **NoMeteo=1**

How to change the image resolution ?

Regarding the image resolution, Fly! Legacy is by default in full screen mode and uses the Windows resolution.

I use multiple monitors (on 2 graphic cards), is it possible to drag a window from one monitor to another ?

For the time being, it is not possible in Fly! Legacy to drag a window towards another monitor, maybe this feature will be available in the future.

How to install Fly! II scenery in Fly! Legacy ?

Copy the directories of the Fly! II scenery into the folder «Scenery» of Fly! Legacy.
It is not mandatory, but it is possible to create sub-directories into the «Scenery» folder, in order to organize the sceneries.
(For example: C:\FlyLegacy\Scenery\France\....)

How to change the time in Fly! Legacy ?

Press the keyboad key "**T**" to advance the time.

How to display the information bar in Fly! Legacy ?

Press on the keyboad "TAB" key to display the information bar on the screen.
This information bar provides info regarding the flight parameters (altitude, speed, rpm...)

How to use the "Slew" mode in Fly! Legacy ?

Press the keyboard key "**S**" to go into «Slew» mode.
In this mode, the aircraft can be oriented in any direction via keys: PgUp, PgDn, Home, End.

The aircraft can move:
- upward: press the keyboard «**Q**» key.
- downward: press the keyboard «**A**» key.
- forward, rearward, left, right: prees the keyboard **arrow keys**.

Have nice flights with Fly! Legacy