GL-117

User Manual

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Chapter 1

GL-117 Installation

This chapter describes the requirements of *GL-117* and its installation concerning esp. the libraries required to compile and execute the game.

1.1 Requirements

GL-117 requires Linux/Unix or MSWindows as operating system as well as properly installed versions of the following libraries:

- OpenGL or MesaGL: graphics library, 3D engine
- GLU or MesaGLU: utilities for GL
- GLUT or MesaGLUT: a toolkit that provides keyboard and mouse support
- SDL (optional): the Direct Media Layer library has similar features of GLUT plus joystick support and basic sound processing
- SDL_mixer (optional): a library that provides advanced multichannel sound support and music

Installation of `SDL` is optional, however strongly recommended.

1.2 Downloading GL-117

The latest *GL-117* release is currently available for download at `http://www.freshmeat.net/gl-117` in `.tar.gz` and `.zip` format. Using MSWindows you may prefer the `.zip` file that may be unpacked with lots of programs like `PKUnzip, Winzip, WinRAR, WinACE`. The `.tar.gz` version can be unpacked with GNU Tar using
`tar xvfz gl-117-x.y.z.tar.gz`
where `x.y.z` is the *GL-117* version number. For last minute updates and release-specific building and install instructions, make sure to have a look at the `README` and `INSTALL` files.

1.3 Linux/Unix installation

If you got a binary `gl-117` in the `linux` directory, you will only need the libraries `GL, GLU, GLUT` and `SDL, SDL_mixer` as described above.

In order to compile *GL-117* you will also have to install the developement versions of the libraries above (except `SDL_mixer`). To compile *GL-117* do the following steps in the gl-117-*VERSION* directory:

```
./configure
make
```

The `configure` script will check for the required libraries and will output a `Makefile`, which can be invoked using the `make` command. After compiling *GL-117* successfully, you will find a binary called `gl-117` in the `src` directory. Move it to the `linux` directory manually and execute.
To really install *GL-117* please use:

```
make install
```

This will copy the binary to your binary directory (e.g. `/usr/local/bin`) and the rest of data files to your data directory (e.g. `/usr/local/share`). Any files that require output permissions will be stored in the user's home directory, exactly `$HOME/.gl-117`.
This step will require write permissions in the binary and data directories. However you may customize these directories using for example

```
./configure --prefix='/home/tom/gl-117'
make
make install
```

1.4 MSWindows installation

First, you might have to install `GL, GLU, GLUT` and `SDL, SDL_mixer`. Look into your system directory, that is generally

```
\WINDOWS\SYSTEM    for Windows9x/ME
\WINDOWS\SYSTEM32  for WindowsNT/2000/XP
```

You will need the files `opengl32.dll, glu32.dll, glut32.dll, sdl.dll, sdl_mixer.dll` there. If one is missing, please search the internet. That's it. Execute the binary `gl-117.exe` in *GL-117*'s `windows` directory.

If you had already an earlier version of *GL-117* you might want to use your old pilots with the new version of the game. Therefore simply copy the old `saves` directory to the new version.

1.5 Running GL-117

At startup, *GL-117* tries to read a file `conf` from the user's home directory (Linux/Unix) or the `saves` directory (MSWindows). If there is none, the game will try out some screen settings and store the file.

`Linux/Unix`	`$HOME/.gl-117/conf`
`MSWindows`	`GL-117-INSTALLDIR/saves/conf`

Edit the file using your favourite text editor and adjust the settings to your system. If you lack a hardware accelerated video card, please turn down the quality to 0 or 1. Further acceleration can be achieved negligating fullscreen mode and choosing a lower resolution.
Just delete the `conf` file if you want to reset to the initial settings.

Chapter 2

GL-117 Aerodynamics

This chapter gives a brief introduction on all the physics a pilot has to consider when flying an aircraft.

2.1 The four forces

During flight the four forces acting on an aircraft are *lift*, *drag*, *thrust*, and *weight*, see fig 2.1.

Lift is the upward force created by the airflow as it passes over the wings. In straight, unaccelerated flight, the lift compensates the *weight force* and therefore, the aircraft does not climb or dive. The lifting force depends on the speed: low speed will cause the airplane to dive, at high speed it will even climb. Always consider the lift vector. If you fly a roll, the lift will not oppose the weight any more and thus, you will lose height.

Drag is the retarding force that limits the aircraft's speed. There are many factors effecting drag, but one main cause is simply the airplane's structure that protrudes into the wind.

Thrust is the forward force provided by the engines.

Adding these four forces shows us how the speed of the fighter will change in the next few seconds. The overall force is measured in 'g' with 1g meaning the earth's gravity (about $9.81 m/s^2$). Pilots are often exposed to more than 1g, but there are clearly limits: high forces above 9g may lead to a blackout and worse, forces below -3g let the blood shoot into the head.

GL-117 provides two models: a simplified aerodynamics model making it much easier to handle the aircraft thus promising more action and a simulation model considering all the physical aspects as described above.

2.2 Three rotation axes

All maneuvering takes place around three axes of rotation. One way to define these axes is a carthesian coordinate system with an x axis from left to right, a y-axis from top to bottom, and a z-axis from near to far. Imagine a flat landscape resembling the x-z plane.

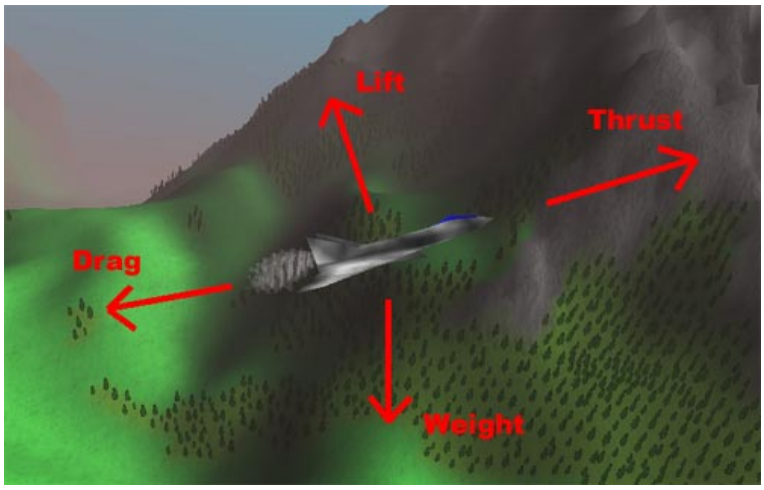


Figure 2.1: The four forces

Your viewing angle within this plane is called the *heading*, whereas an orthogonal angle is called the *elevation*. Just look at figure 2.2.

But we can also define three axes of rotation referring to our fighter. They are known as the *longitudinal axis*, *lateral axis*, and *vertical axis*. Imagine a coordinate system with the origin at your fighter's center of gravity. The center of gravity is the theoretical point where the entire weight of the aircraft is considered to be concentrated.

The *lateral axis* is an imaginary axis protruding through the side of the aircraft. A rotation around this axis is known as pitching. This pitch movement is produced by the elevators and will affect your heading and elevation.

The *longitudinal axis* is an imaginary axis protruding through the nose of the aircraft. A rotation around this axis is known as a roll. This roll movement is produced by the ailerons. Consider that a roll will not change your heading.

The *vertical axis* is an imaginary axis protruding through the top and bottom of the aircraft. A rotation around this axis is know as yawing. This yaw movement is produced by the rudder.

Now, look at fig 2.2. The blue arrows show the elevator's effect: your fighter will either move up and left or it will drop down to the right (the lateral axis). Using the rudder will move the fighter slightly towards the green arrows (the vertical axis).

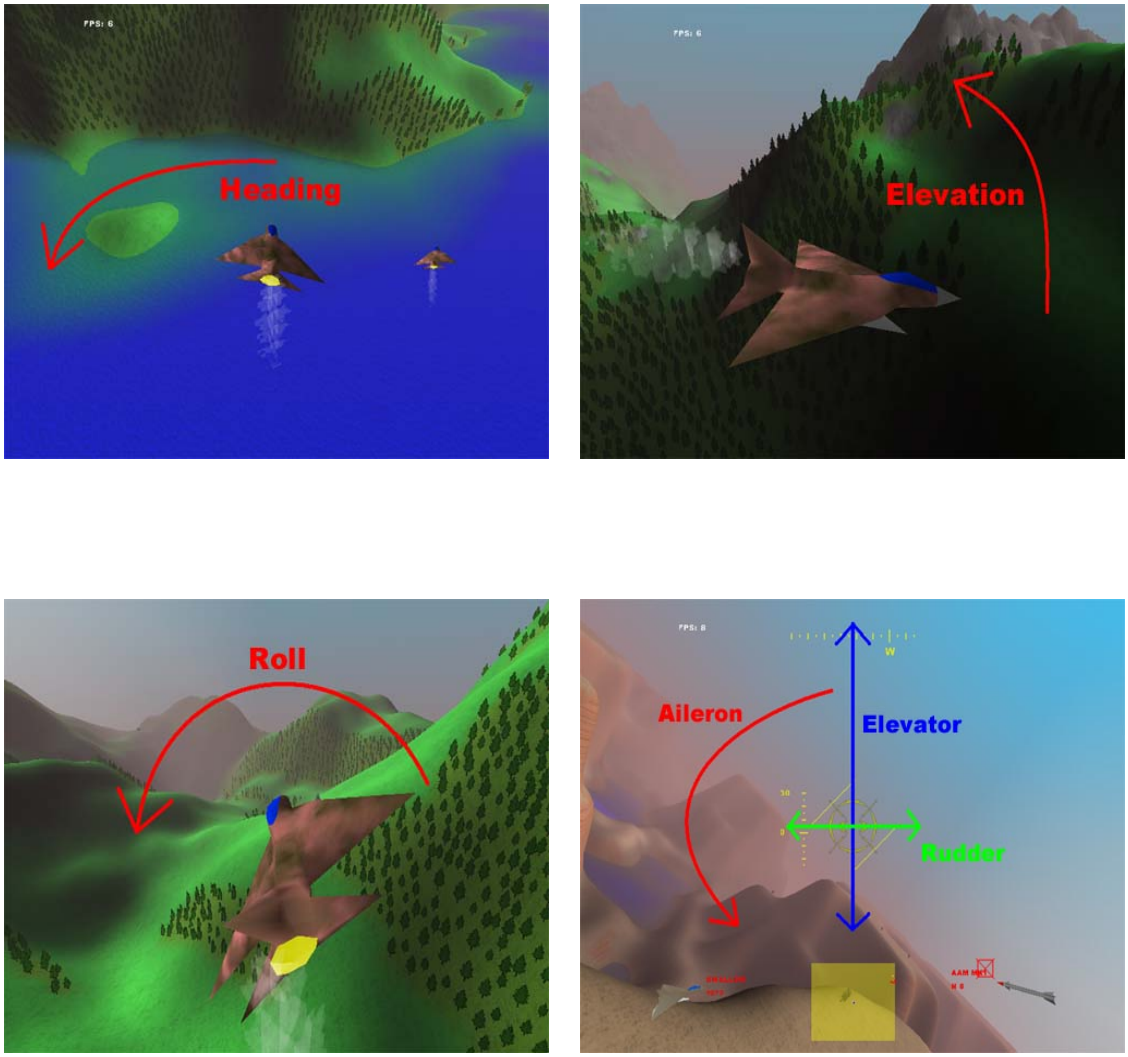


Figure 2.2: The three axes of rotation

Chapter 3

GL-117 Basics

Having understood the physical aspects of piloting, you may now get an introduction to the game itself.

3.1 Cockpit controls

Figure 3.1 shows a typical *HUD* (head-up display):

- A: your current heading, showing the letters `'N', 'E', 'S', W` to represent north, east, south, west.
- B: your current elevation in degree; the rotating lines reveal the horizon and thus your roll angle.
- C: your current target
- D: the radar reveals the position of other targets. Enemies are marked red, allies blue, missiles white. The screen is only 2D, so it will only reveal the necessary *heading* to other targets.
- F: your currently selected weapon
- G: the chaff/flare countermeasure systems alarms you about enemy missiles.

3.2 Input devices

GL-117 supports a number of devices depending on `GLUT` and `SDL`. You may choose your preferred input device within the options menu. It is strongly recommended to use a joystick, however the mouse interface is also very easy to handle.

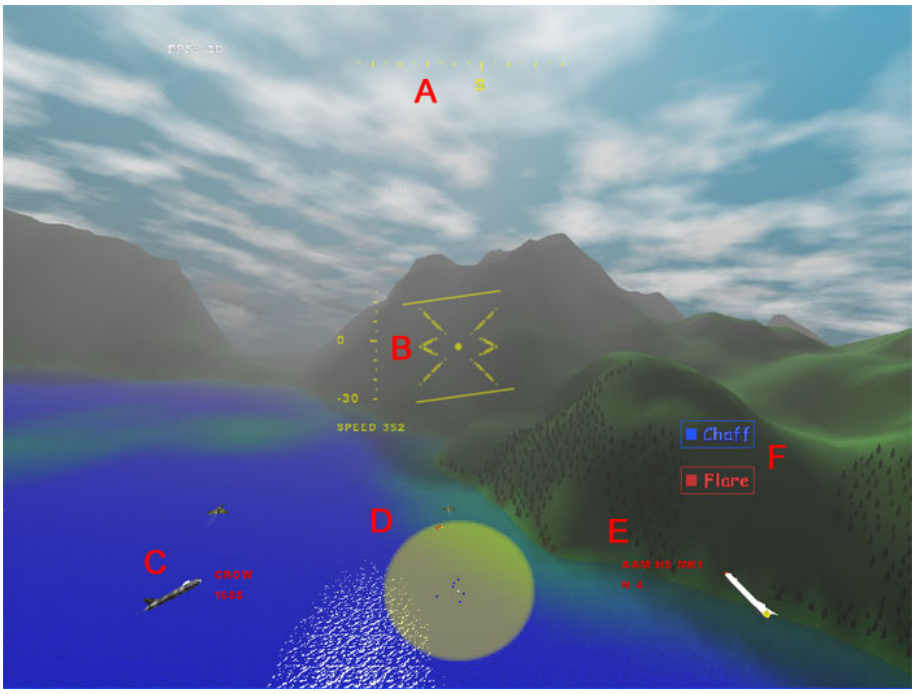


Figure 3.1: A typical HUD of GL-117

3.2.1 The keyboard

KEY	MEANING
UP, DOWN	Elevator
LEFT, RIGHT	Roll
PAGEUP, PAGEDOWN	Rudder
1, 2, 3, 4, 5, 6, 7, 8, 9	Throttle
SPACE	Fire cannon
m	Change weapon/missile
ENTER	Fire weapon/missile
t	Target next object
p	Target previous object
e	Target nearest enemy
p	Target locking enemy
ESC	Main menu
F1	Cockpit camera
F2	Chase camera
F3	Rear camera
F4, F5	Side cameras
F6, F7, F8	Top cameras

Note that the tabular only shows the predefined settings. You may customize the keyboard editing the file `conf.interface` located in the `saves` directory on MSWindows, in the directory `$HOME/.gl-117` for UNIX respectively.

3.2.2 The mouse

Moving the mouse up or down will change the elevator to fly a loop, whereas moving left or right will result in a roll, a slight movement will affect the rudder.
To change your heading, you will thus have to move the mouse cursor completely to the left/right for a short moment (just figure it out) in order to fly a quarter roll. Return the mouse cursor to the center immediately! Then alter the elevator moving the mouse to the top center of your screen to fly a "loop" parallel to the surface.
The left mouse button can be used to fire the cannon, the right button will fire the weapon/missile, although it is recommended to use the keyboard for targeting and firing purpose.
Look at the keyboard table for a list of keys.
Along with the "mouse easy" interface comes the possibility to revert the elevator controls, called "mouse reverse". Only experienced players should use this option.

3.2.3 The joystick

The easiest interface to play *GL-117* is likely the joystick.
GL-117 supports up to 10 joysticks each having up to 10 axes, however the standard settings include one joystick with 4 axes: moving the joystick up or down will change the elevator, moving left or right will affect the aileron, turning the joystick along the rudder will alter the fighter's rudder settings, and moving the throttle will change the fighter's throttle.

Depending on your joystick, *GL-117* supports four buttons: fire cannon, target nearest enemy, fire countermeasure, fire weapon/missile. The coolie hat is used for targeting purpose.

Feel free to edit the text file `conf.interface` to completely adjust all the settings as you wish.

3.3 The menu

As the menu is almost completely self-explanatory, there is only a brief description of the different menu items:

- The `PILOTS` menu lets you create and delete pilots. You can play only one pilot at a time.
- The `MISSIONS` menu shows all available missions. You have to succeed in a mission to enable the next one. Every mission you succeed will earn you a certain score, being calculated depending on the time it took, the shield you lost, how many targets you eliminated, and a difficulty bonus. High scores are necessary to get a promotion to a higher military rank. The difficulty bonus is added to the overall score automatically.
- Several `OPTIONS` may be adjusted: quality, view, sound, music, difficulty.

To get the best graphics possible on your system, always look at the `FPS` rate which describes the number of frames per second. This rate is directly influenced by the quality and view settings and should not drop below 25. If your rate is above 50 FPS, you should use higher/better quality and view settings. You should also try out higher screen resolutions modifying the file `conf` located in the `saves` directory on MSWindows, in the directory `$HOME/.gl-117` for UNIX respectively.

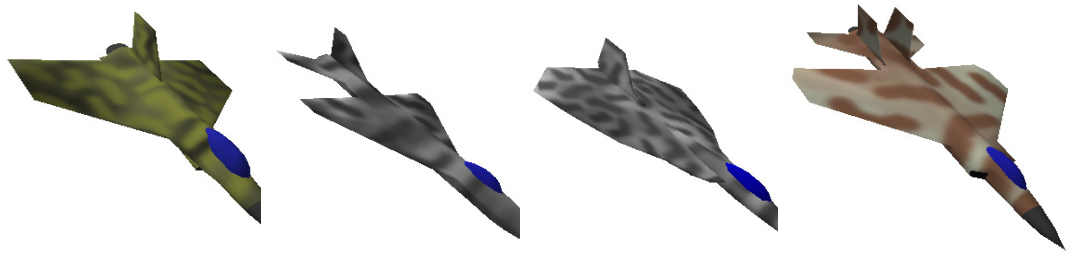
Chapter 4

The Eagle Squad

You will fly missions for the Eagle Squad, which is known for a good equipment and the best pilots. Just look at the fighter and pilot overviews.

4.1 The Fighters

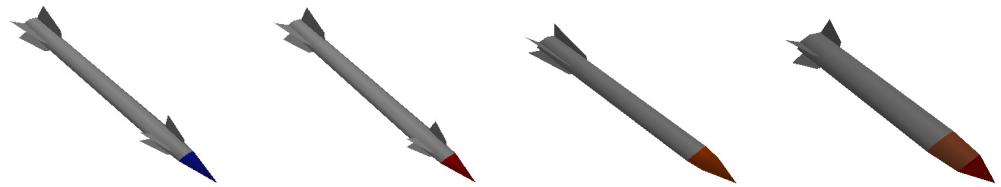
GL-16 Falcon: Crow: GL-22: Hawk Swallow:



The GL-16 is the Eagle Squad's fighter used to get rid of bombers like the Swallow, whereas the GL-22 can take more missiles at the cost of manoeverability. At the beginning of each mission, you can decide which fighter to take, but be careful: only the heavy bombers have enough firepower to destroy static buildings.

4.2 The Weapons

FF (friend-foe): IR (infra-red): AGM (air-gr.): DF (dumb fire):



Use FF missiles early when approaching the enemy. They will search their target using a radar system, however a chaff cloud may fool them.

IR missiles can only track the enemy by heat and must therefore be fired at the enemy's back. Flares consisting of burning magnesium can be used as a countermeasure.

AGMs are radar controlled missiles used to take out medium ground targets like tanks.

DF missiles will only fly straight ahead like cannon shots, but can cause an enormous amount of damage, so they are used to take out huge ground targets like buildings.