

GL-117
Action Flight Simulator
User Manual

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Contents

1	GL-117 Installation	3
1.1	Requirements	3
1.2	Downloading GL-117	3
1.3	Linux/Unix installation	3
1.4	MSWindows installation	4
1.5	Running GL-117	4
2	GL-117 Aerodynamics	6
2.1	The four forces	6
2.2	Three rotation axes	6
3	GL-117 Basics	10
3.1	Cockpit controls	10
3.2	Input devices	10
3.2.1	The keyboard	11
3.2.2	The mouse	12
3.2.3	The joystick	12
3.3	The menu	12
3.4	Graphics optimization	12

1 GL-117 Installation

This chapter describes how to download and install *GL-117* on your system.

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.

1 *GL-117* Installation

In order to compile *GL-117* you will also have to install the development 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.

1 GL-117 Installation

Linux/Unix	<code>\$HOME/.gl-117/conf</code>
MSWindows	<code>GL-117-INSTALLDIR/saves</code>

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 neglating fullscreen mode and choosing a lower resolution. Just delete the `conf` file if you want to reset to the initial settings.

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.

However *GL-117* uses a simplified aerodynamics model making it much easier to handle the aircraft. The four forces are simulated in a very easy way and not very realistic. *GL-117* does not claim to be a training simulator, but aims to provide as much action as possible.

2.2 Three rotation axes

All maneuvering takes place around three axes of rotation. One way to define these axes is a cartesian 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. Your viewing angle within this plane is called the **heading**, whereas an orthogonal angle is called the **elevation**. Just look at the figures 2.2 and 2.3.

But we can also define three axis 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, see 2.3 and will affect your heading and elevation.

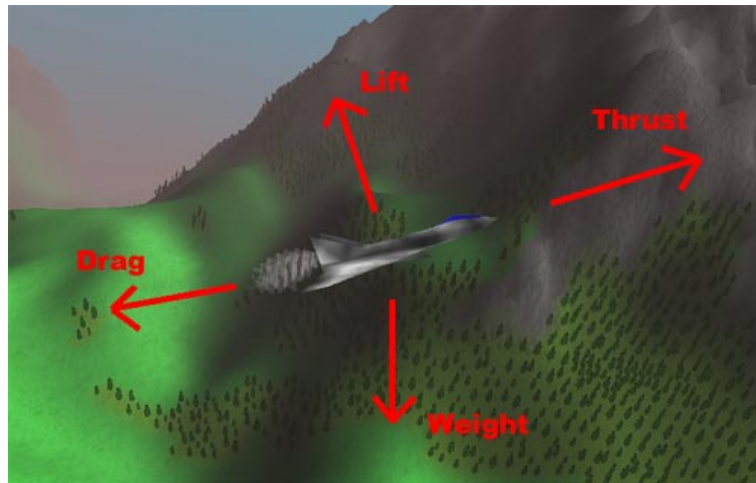


Figure 2.1: The four forces

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, see fig 2.4. 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 known as yawing. This yaw movement is produced by the rudder.

Now, look at fig 2.5. 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).

2 GL-117 Aerodynamics



Figure 2.2: Heading



Figure 2.3: Elevation

2 GL-117 Aerodynamics

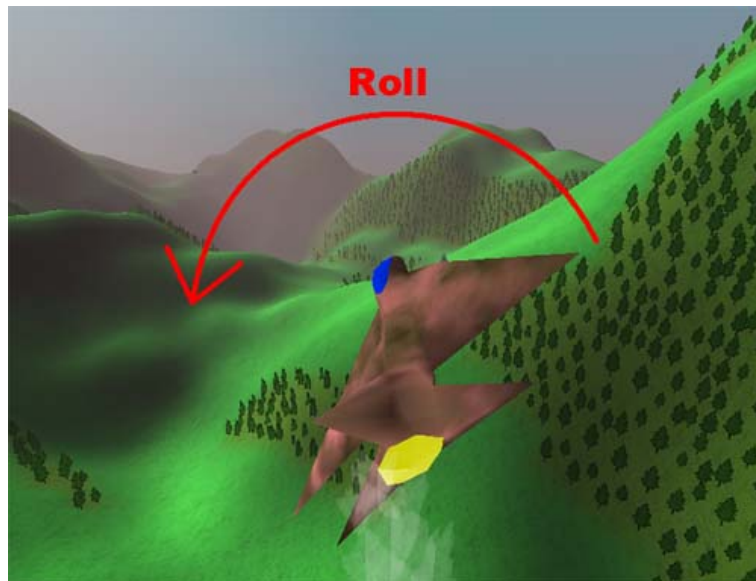


Figure 2.4: Roll

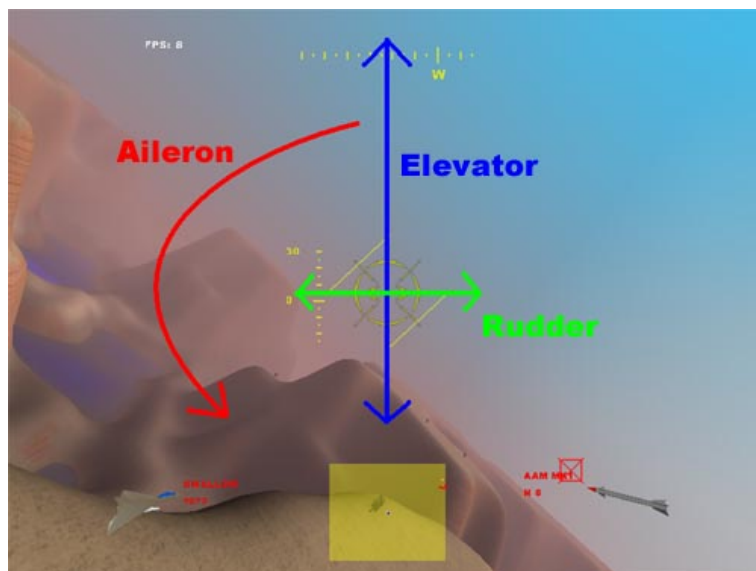


Figure 2.5: Aileron, elevator, and rudder

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 (heads 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: the autotargeter shows you the best way to the current target.
- D: your current target
- E: the radar reveals the position of other targets. Enemies are marked red, allies blue, and the current target is represented as yellow point. The screen is only 2D, so it will only reveal the necessary heading to get other targets.
- F: your currently selected weapon

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.

3 GL-117 Basics

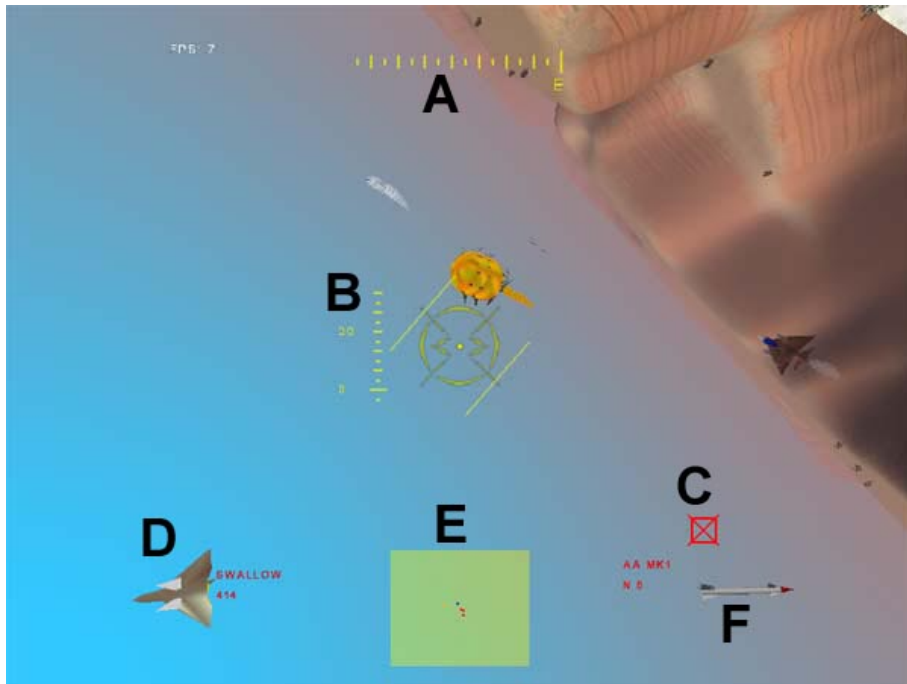


Figure 3.1: A typical HUD of GL-117

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
e	Target nearest enemy
ESC	Main menu
F1	Cockpit camera
F2	Chase camera
F3	Rear camera
F4, F5	Side cameras
F7	Top camera
F8	Show Map

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.

3.2.3 The joystick

The easiest interface to play *GL-117* is clearly the joystick.

GL-117 supports up to four joystick axis: 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, change weapon/missile, fire weapon/missile.

Any properly installed joystick will be available automatically.

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.
- Several **OPTIONS** may be adjusted: quality, view, sound, music, difficulty.

3.4 Graphics optimization

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 20. If your rate is **perfect**, you should use higher/better quality and view settings. You should also try out higher screen resolutions modifying the file **conf**. On **MSWindows** you will find it in the **saves** directory, on **UNIX/Linux** it is stored in the directory **\$HOME/.gl-117**.