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Abstract

This document explains how to install and configure the OCTAVie software on a Windows system. It details the required dependencies and setup steps to ensure proper execution of the graphical interface and communication with the FPGA. The procedure includes installing necessary libraries and drivers, as well as configuring the environment for smooth operation. Following this guide allows users to easily reproduce a functional setup and run the OCTAVie software reliably under Windows.

Install Dependances Windows

English – v1.0

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# Introduction

This document explains how to install the dependencies required to run or rebuild the OCTAVie PC software on Windows.

There are two cases:

* Case A — Run-only (prebuilt executable, Windows x64)  
  You only want to run the program provided as a .exe (no source code changes).  
  👉 Install GTK4 runtime for Windows x64 only.
* Case B — Develop & Rebuild (from sources)  
  You want to edit the code and recompile using the provided Makefile.  
  👉 Install a full MSYS2/MinGW-w64 toolchain + GTK4 dev packages.

# Case A — Run the prebuilt executable (Windows x64)

Goal: run OCTAVie.exe without compiling anything.

⚠️ For GTK4 on Windows, there isn’t a single “official GTK4 runtime installer” like there was for GTK2/3. The recommended way for end-users is to install the MSYS2-based GTK4 runtime (which provides the GTK4 DLLs), or—alternatively—you bundle the DLLs yourself with the app. Below uses the MSYS2 runtime, which is simple and reliable. [The GTK Team+1](https://www.gtk.org/docs/installations/windows?utm_source=chatgpt.com)

## A1) Install the GTK4 runtime via MSYS2 (recommended)

1. **Download MSYS2 (64-bit)**  
   Open the official MSYS2 site and download the x86\_64 installer (“msys2-x86\_64-….exe”). [packages.msys2.org](https://packages.msys2.org/package/mingw-w64-x86_64-gtk4?utm_source=chatgpt.com)
2. **Install with defaults**
   * Run the installer, keep default path C:\msys64.
   * Finish and launch “MSYS2 MinGW64” from the Start Menu (not “MSYS” and not “UCRT64”).
3. **Update the package database**  
   In the MSYS2 MinGW64 terminal, run:

pacman -Syu

if it asks to close/reopen, do so, then:

pacman -Su

1. **Install the GTK4 runtime package (x64)**  
   Still in MinGW64:

pacman -S mingw-w64-x86\_64-gtk4

This pulls the GTK 4.x DLLs and dependencies for 64-bit Windows. [packages.msys2.org](https://packages.msys2.org/package/mingw-w64-x86_64-gtk4?utm_source=chatgpt.com)

1. **(Option A) Add the GTK/MinGW64 bin folder to PATH (so Explorer can find DLLs)**
   * Windows: open System Properties → Environment Variables → System variables → Path → Edit.
   * Add:
   * C:\msys64\mingw64\bin
   * Click OK on all dialogs.

**OR**

**(Option B) Run from the MinGW64 shell (no PATH edits needed)**  
Launch “MSYS2 MinGW64” and run your .exe from there (this shell already has the right PATH).

1. Verify GTK4 is present (optional)  
   In MinGW64:

pkg-config --modversion gtk4

You should see a 4.x version. (This confirms the runtime is correctly installed.) [packages.msys2.org](https://packages.msys2.org/package/mingw-w64-x86_64-gtk4?utm_source=chatgpt.com)

1. **Run OCTAVie (Windows x64)**
   * If you added PATH (step 5A): double-click your prebuilt OCTAVie.exe (e.g. in 4.software\_pc\2.build\OCTAVie.exe).
   * If using the MinGW64 shell (step 5B):

cd /c/path/to/OCTAVie\_FPGA\_release/4.software\_pc/2.build

./OCTAVie.exe

**Notes and alternatives**

Why MSYS2? It’s the GNOME/GTK-recommended route for GTK on Windows, and is how GTK4 binaries are distributed on Windows today. [The GTK Team](https://www.gtk.org/docs/installations/windows?utm_source=chatgpt.com). Old “GTK runtime installers” you may find (e.g., *tschoonj*’s project) primarily target GTK2/GTK3 and are not maintained for GTK4; prefer the MSYS2 route for GTK4. [GitHub+1](https://github.com/tschoonj/gtk-for-windows-runtime-environment-installer/releases?utm_source=chatgpt.com) . Bundling instead of installing: an alternative is to ship OCTAVie.exe with the required GTK4 DLLs in the same folder (portable ZIP or proper installer). This avoids asking users to install MSYS2, and is generally recommended for production distribution. [GNOME Discourse+1](https://discourse.gnome.org/t/convert-gtk4-project-to-exe-without-need-to-install-on-gtk4-on-customer-client/11115?utm_source=chatgpt.com)

## A2) Quick “it works” checks (optional)

From MinGW64: gtk4-demo

If it launches, GTK4 is available and functional (the demo comes from the MSYS2 GTK4 package). [packages.msys2.org](https://packages.msys2.org/package/mingw-w64-x86_64-gtk4?utm_source=chatgpt.com)

From CMD/PowerShell (only if you added PATH): where gtk4-demo

You should see it resolvable under C:\msys64\mingw64\bin\.

## A3) Common issues (and fixes)

* OCTAVie opens in MinGW64 shell but not by double-click  
  → You likely didn’t add C:\msys64\mingw64\bin to PATH. Add it (A1-5A) or bundle DLLs. [The GTK Team](https://www.gtk.org/docs/installations/windows?utm_source=chatgpt.com)
* “gtk-4-1.dll not found” or similar  
  → Install mingw-w64-x86\_64-gtk4 and ensure PATH includes C:\msys64\mingw64\bin. [packages.msys2.org](https://packages.msys2.org/package/mingw-w64-x86_64-gtk4?utm_source=chatgpt.com)
* Multiple GTK installs conflicting  
  → Ensure your PATH points to the mingw64 location first; remove/adjust older GTK entries.

# Case B — Develop & Recompile the Software (Windows x64)

**Goal:** build OCTAVie.exe from the source files using the provided Makefile.  
This section explains how to install the full development environment (compiler + GTK4 libraries + tools) and verify the build.

## B1) Overview

The OCTAVie PC software is written in C and relies on GTK4 for its graphical interface.  
The project includes a ready-to-use Makefile located in:

4.software\_pc\1.sources\Makefile

It automatically compiles all source files (main.c, gui.c, io.c) and links them with the required GTK4 libraries. The resulting executable is named OCTAVie.exe.

⚠️ Before compiling, open the Makefile and verify that the compilation flags include  
-DOS\_WIN. This macro ensures that the source code is compiled for a Windows environment. Without it, certain system-dependent functions (e.g., threading or file access) may fail to compile or behave incorrectly.

## B2) Install MSYS2 (MinGW-w64 for Windows x64)

1. Download the latest 64-bit installer:  
   👉 https://www.msys2.org/
2. Run the installer and keep the default path:

C:\msys64

1. When installation finishes, open the MSYS2 MinGW64 terminal from the Start Menu  
   (the window title should start with MINGW64).

## B3) Update and synchronize packages

In the MinGW64 terminal:

pacman -Syu

# If asked to close/reopen, do so, then:

pacman -Su

This ensures MSYS2 is fully up to date before you install the toolchain.

## B4) Install compiler, GTK4 development libraries, and tools

In the MinGW64 terminal (run each command line separately):

pacman -S mingw-w64-x86\_64-toolchain

pacman -S mingw-w64-x86\_64-gtk4

pacman -S mingw-w64-x86\_64-pkg-config

pacman -S make git

These packages install:

* gcc/g++ — the C compiler for Windows x64
* GTK4 headers and libraries
* pkg-config — used by the Makefile to retrieve GTK compiler flags
* make — for building the project
* git (optional) — to clone the repository

## B5) Verify the installation

Run:

pkg-config --modversion gtk4

Expected output: a version number such as 4.14.3  
(if you get an error, ensure you are in the MinGW64 shell, not plain MSYS).

You can also check the compiler:

gcc --version

## B6) Get the source code

If you don’t already have the project, clone it:

cd /c/path/to/your/workspace

git clone https://github.com/laura7durieux/OCTAVie\_FPGA\_release.git

Source folder for the PC software:

OCTAVie\_FPGA\_release/4.software\_pc/1.sources/

## B7) Build the software

1. Enter the source directory:

cd /c/path/to/OCTAVie\_FPGA\_release/4.software\_pc/1.sources

1. Compile using the Makefile:

make

The Makefile will:

* Compile each source file with:
* gcc -c `pkg-config gtk4 --cflags` <source>.c -D\_REENTRANT -DOS\_WIN
* Link all object files into one executable:
* gcc main.o gui.o io.o -o OCTAVie `pkg-config gtk4 --libs` -lm -lpthread

1. If everything is successful, you’ll see a new file:
2. OCTAVie.exe

## B8) Move the executable to the build folder (optional)

For consistency with the repository layout:

mkdir -p ../2.build

cp OCTAVie.exe ../2.build/OCTAVie.exe

## B9) Run the application

You can launch the software in two ways:

**Option A — From the MinGW64 shell**

cd ../2.build

./OCTAVie.exe

This uses the GTK4 libraries already available in C:\msys64\mingw64\bin.

**Option B — Directly from Windows Explorer**

If you prefer to double-click the .exe, ensure the GTK4 runtime is installed (as described in Case A) or add the following to your Windows PATH:

C:\msys64\mingw64\bin

## B10) Clean and rebuild

make clean

make

The clean rule removes all .o files so you can perform a fresh build.

## B11) Troubleshooting (build phase)

|  |  |  |
| --- | --- | --- |
| Error message | Possible cause | Fix |
| pkg-config: command not found | You’re in the wrong shell or missing the package | Use MSYS2 MinGW64 and install mingw-w64-x86\_64-pkg-config |
| Package 'gtk4' not found | GTK4 dev libs missing | Run pacman -S mingw-w64-x86\_64-gtk4 |
| undefined reference to 'pthread\_\*' | Thread library linking issue | Ensure -lpthread is present or try -lwinpthread |
| rm not recognized | Running make clean from CMD | Run it inside the MinGW64 shell |
| .exe works only in shell | PATH missing GTK DLLs | Add C:\msys64\mingw64\bin to Windows PATH |

## B12) Optional — Distribute a stand-alone build

To avoid requiring MSYS2 on user machines, you can bundle the following DLLs next to OCTAVie.exe (found in C:\msys64\mingw64\bin):

libgtk-4-1.dll

libgobject-2.0-0.dll

libglib-2.0-0.dll

libgio-2.0-0.dll

libgdk-4-1.dll

libcairo-gobject-2.dll

libcairo-2.dll

libpango-1.0-0.dll

libpangocairo-1.0-0.dll

Place them in the same folder as the executable (e.g., 4.software\_pc\2.build\).  
This makes OCTAVie fully portable on Windows x64.

## B13) Summary of commands (quick reference)

**Commands to run in MSYS2 MinGW64 shell**

pacman -Syu && pacman -Su

pacman -S mingw-w64-x86\_64-toolchain mingw-w64-x86\_64-gtk4 mingw-w64-x86\_64-pkg-config make git

pkg-config --modversion gtk4

cd /c/path/to/workspace

git clone https://github.com/laura7durieux/OCTAVie\_FPGA\_release.git

cd OCTAVie\_FPGA\_release/4.software\_pc/1.sources

make

mkdir -p ../2.build

cp OCTAVie.exe ../2.build/OCTAVie.exe

cd ../2.build

./OCTAVie.exe

# Clean rebuild

cd ../1.sources

make clean

make

**Commands to run in Windows PowerShell**

# (Optional) Temporary PATH for GTK4 DLLs

$env:Path = "C:\msys64\mingw64\bin;" + $env:Path

cd C:\path\to\OCTAVie\_FPGA\_release\4.software\_pc\2.build

.\OCTAVie.exe

# License Information

**Hardware license**: CERN Open Hardware License v2 (Strongly Reciprocal – OHL-S).

**Software license**: GNU General Public License v3 (GPLv3), ensuring that all modifications remain open-source.

**Documentation license**: Creative Commons Attribution-ShareAlike 4.0 International (CC-BY-SA 4.0).

# Versioning

|  |  |  |  |
| --- | --- | --- | --- |
| Authors | Version | Date | Comment |
| L. Durieux | V1.0 | 30.10.2025 | Document first release |
|  |  |  |  |