

Tech corner – RTL-SDR waterfall by Airspy

Ever since they've seen the waterfall on the screens of their friends, numerous envious hams have wanted to know how to display something similar on their own screens. This short project will walk you through the steps of doing exactly that. Then, your computer screen will be the envy of other operators.

The two keys are the RTL-SDR dongle (a device that hangs off your computer USB port) and the Airspy software. Although I've listed the original silver V3 dongle below, the black V3 or V4 dongle will also work. The RTL-SDR device is known as an **SDR** (software-defined receiver), as its name implies, meaning that nearly all the radio functions (pre-amplification, oscillation, mixing, filtering, demodulation, etc.) are built into software (firmware, actually), and that it's intended for receiving signals, not transmitting them.



Furthermore, your financial situation might put a nice, expensive rig outside your reach for that pretty waterfall screen. For less than fifty bucks, you can have the entire HF world at your fingertips. It's assumed, however, that you have already installed an antenna capable of receiving the band(s) that you want to display. Then again, even if you don't have a proper ham radio antenna, a long piece of wire will also work, since this is a receive-only setup.

These instructions are taken from a subset of those found on the [RTL-SDR Quick Start Guide](#). One problem is that the online instructions are somewhat technical and a little confusing, so the hope here is to help you navigate the setup quickly and easily. To do so, however, it's also assumed that you'll be installing the Airspy software onto Windows 10 or 11. Similar software is available for Linux and Mac (instructions at the end of the online Quick Start Guide), but I'm going to walk you through the Windows application setup.

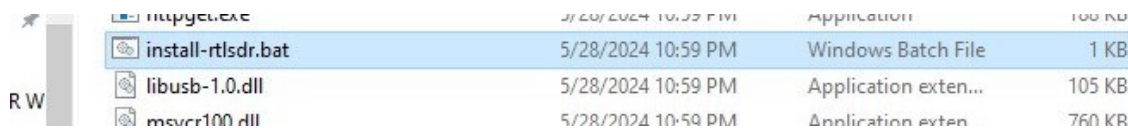
Parts list

One [RTL-SDR dongle](#)

One [SMA-Male to SO-239 jumper](#)

Software installation

1. Open a browser and visit <https://airspycom>.
2. At the top of the page, click **Download**.
3. After "Software Defined Radio Package (Change Log)" click the **Download** button.
4. Open your computer's Downloads folder, then Extract all the files of the sdrsharp-x86.zip file into your Downloads folder.
5. Double-click install-rtlsdr.bat.



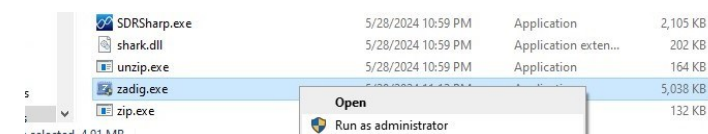
6. If you see a "Windows protected your PC" window, click "More info"; skip to 8 if you don't.
7. Click "Run anyway" near the bottom.
8. Once the download completes, after it displays "Press any key to continue. . .", press the space key.



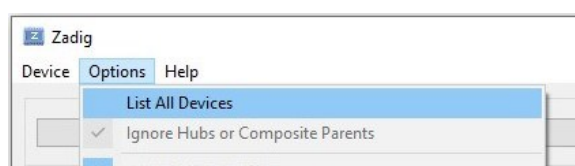
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9. Plug the RTL-SDR dongle into your computer's USB port, and wait until Windows tells you that it has detected a new device, and then that all its drivers are installed.

10. Locate the `zadig.exe` file in the folder where you extracted the first files, right-click it, then select **Run as administrator** and confirm that you allow the program to make changes.

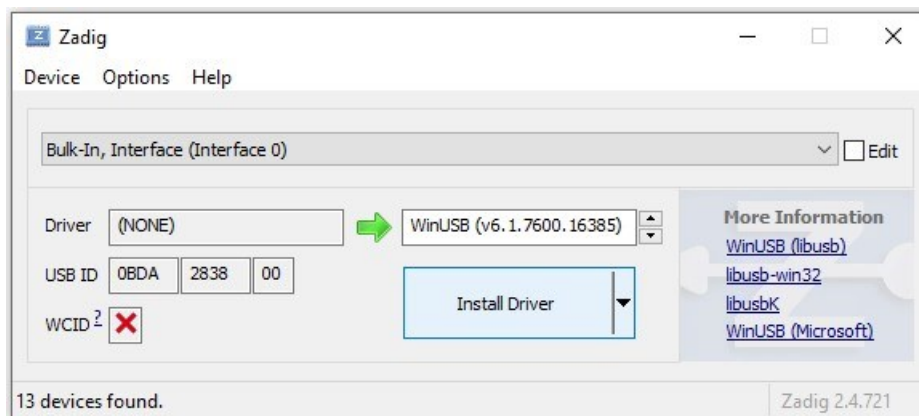


11. In the Zadig program, click the **Options** tab, then select **List All Devices**.



12. Click the long drop-down and select **Bulk-In, Interface (Interface 0)**.

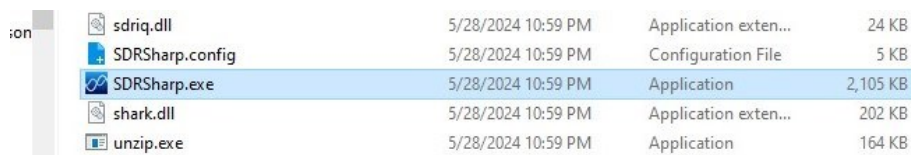
13. The Zadig window should show a) "WinUSB" to the right of the green arrow and b) "0BDA 2838 00" in the **USB ID** boxes.



14. Click the big box in the middle, which should read **Replace Driver** or **Install Driver**, then click through the warnings, if any should appear.

15. Once Zadig reports that the driver has been installed, click Close.

16. Locate the `SDRSharp.exe` file in the folder where you extracted the first files, and double-click it to open SDRSharp (if you see more than one, double-click the Application).



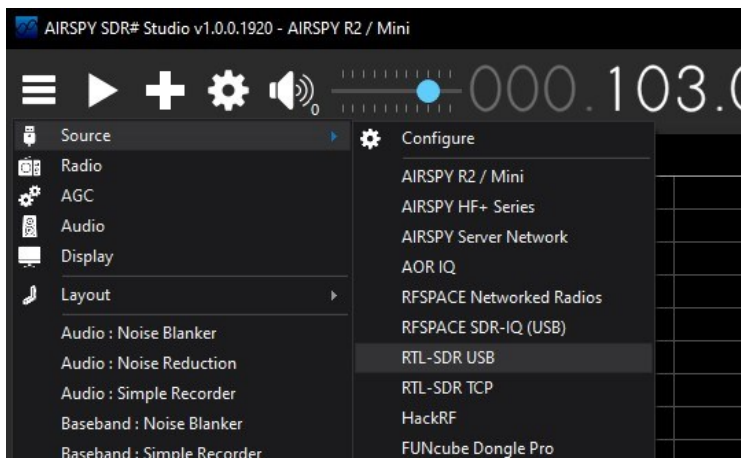
17. If a message pops up that prompts you to install the .NET Desktop Runtime, click Download it now, then go through the steps to install it

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18. If you had to install the .NET Desktop Runtime, double-click SDRSharp.exe again.

19. Click the hamburger menu (the three horizontal lines in the upper-left corner).

20. Hover over Source and select **RTL-SDR USB**.



21. Click the **Play** button (right-pointing triangle), and the SDR will start.



Hardware installation

By now, you've already attached the RTL-SDR dongle to your USB port. Next, install a jumper to the SMA connector of the dongle, then your antenna coax to the other end of the jumper. You should start seeing signals appear on the AirSpy waterfall, but they're not likely tuned to any meaningful frequency.

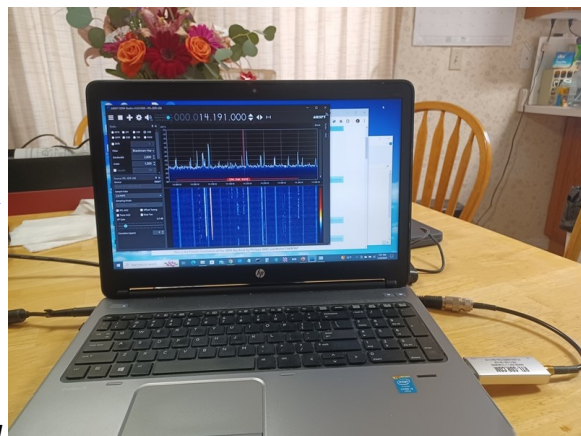
Software operation

1. Click on the large numerals to tune to your frequency of choice. When you click on the upper-half of each digit, the frequency changes to a higher frequency according to the order of the digit. The frequency changes to a lower frequency when you click on the lower half. For example, if the frequency shown is 103.000.500, and you click on the bottom half of the "3" digit, the display changes to 102.000.500, and so forth.
2. Near the upper-right corner, click Zoom and drag the slider up and down to adjust the displayed range. Play with the other settings under Zoom to adjust the display to your taste.
3. For amateur frequencies keep the Bandwidth to between 2,400 and 2,800.
4. Some tips for a better view or listening experience include lowering the RF gain, lowering the Offset, and lowering the Contrast.

Summary

A software-defined radio is a radio receiver, complete with tuning and other controls, made from software and embedded onto a USB stick device. The argument can be made that the [web SDR](#) does precisely the same thing and more (because of its magnificent antennas), but the web SDR depends on the internet connection, and you have complete control of your own SDR. I'm pretty sure similar software exists for my Samsung (Android OS) phone, so that might be homework for me next time.

Noji Ratzlaff KNØJI



My finished setup, complete with flowers