

Getting Started with Radio-SkyPipe

Radio-SkyPipe (RSP) is a computer program that is used to collect and display real world data in the form of a strip chart. A strip chart is simply a line graph where the horizontal (X) axis is time and the Y axis represents the value of whatever you are measuring. The chart thus is a depiction of how some value changes over time. Perhaps the only thing that makes it different from an ordinary chart is that it is usually used to chart the data in real time, that is, as the data is collected. In the past, strip chart recorders where mechanical devices that scrolled a continuous piece of graph paper under a moving pen. They were expensive and often messy contraptions that tended to leak ink or run out of paper at the worst possible time. Computer based strip chart recorders are far more flexible and reliable.

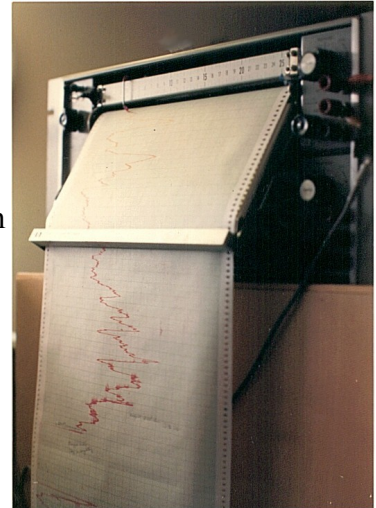


Illustration 1: Mechanical strip chart recorder.

Now that you know what a strip chart recorder does, let's get down to using one.

Installing Radio-SkyPipe

Radio-SkyPipe must be installed on a Windows® computer. It may be possible to run RSP on Win98 or Win98se but Windows Xp or beyond is preferred. While the program may run with as little as 64 Megabytes of memory, performance may suffer and you should try to up the memory level to 256 M or more. If you wish to share data with others in real time, a network connection is of course required.

The most recent versions of Radio-SkyPipe can always be obtained by download at <http://radiosky.com/skypipeishere.html>. The same software is downloaded for the Free version of RSP as for the Pro version. Pro version users must apply a user name and password that unlocks all of the Pro features. We refer to this as an upgrade procedure, that is, upgrading from the Free to the Pro version. You may purchase an upgrade from the download URL. This process is detailed again later in this guide.

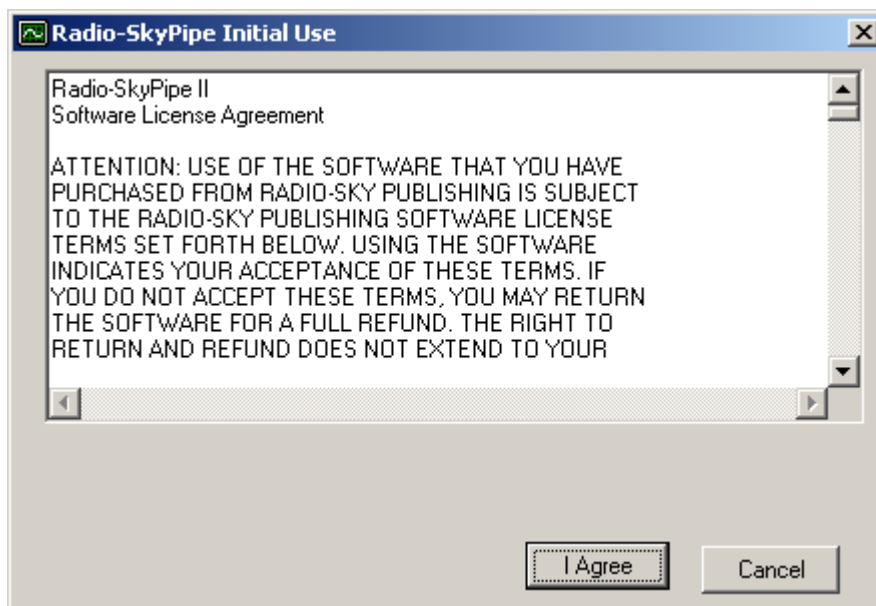
I strongly suggest that you do not run the downloaded installation file from the default Windows temporary directory. This can lead to conflicts when old installation programs from other programs have not been completely removed. Instead, create a separate install directory and save the downloaded installation file to that directory. You can then run the installation file from there. On my website I have a more detailed explanation of this at:

http://radiosky.com/installing_programs_from_the_web.html

Allow the program to install into the default location under *Program Files* . Occasionally a computer will need to have some files updated before the installation can proceed. This may require a restart of the computer. The second time through the installation process things should progress normally.

Running RSP for the First Time

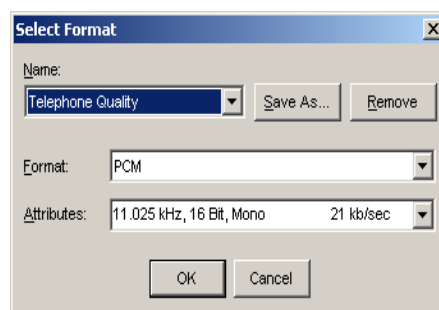
When you run RSP for the first time you will see the following screen:



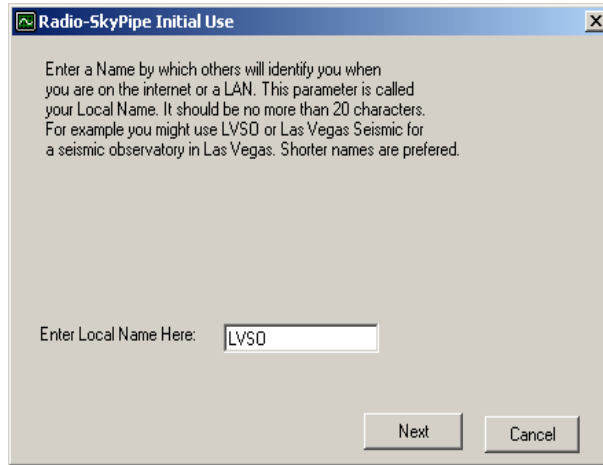
Click **I Agree** if after reading this very long and boring bunch of legal stuff you do agree to the terms of the license or if you don't agree just click **Cancel**.

If you have Radio-SkyPipe 1.X installed on the PC you will be asked if you want to import settings from that version into Radio-SkyPipe II. If you select yes you are given instructions on how to save a Profile from this older version so that the old settings will be automatically imported into RSP II. After importing your old settings the First Use process is completed so you can skip down in this document to beyond the installation section.

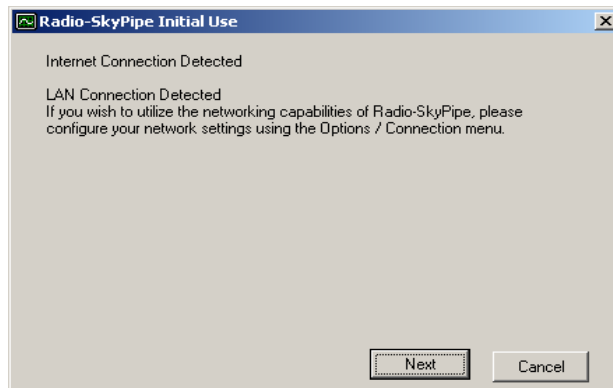
Assuming you did not import settings from RSP 1.X, you are next prompted to select a sound format to use with your sound card. This can be a little confusing but it is necessary. The recommended default sound format for RSP II is 11025 Hz Mono PCM encoding. (If you use two sound channels you will switch this to Stereo later). You select the sound format using the **Select Format** dialog box shown below. Some formats are named on some computers so try selecting Telephone Quality from the drop down Name list in the upper left if it exists as an option. If that does not work select the parameters as shown in the other list boxes and press OK. Then press **Next** on the **Radio-SkyPipe Initial Use** panel.



Next, you are instructed to enter a Local Name. A Local Name is just a nickname of sorts that is useful in tracking your data files and your presence on the Internet should you chose to make your data public. The Local Name should be kept short. Twenty characters is the maximum allowed length. Don't worry you can change this later to something more appropriate if you wish. Press the Next button after you have entered the information. A screen similar to the following may appear.



If you have an active Internet connection, the **Initial Use** screen may detect it. It attempts to set your default networking parameters appropriately from this detected information. However, you should also check on the settings yourself after the program starts. You will find network settings under the Connection tab of the Options menu. Networking can be a frustrating task and it may require some study and patience. Radio-SkyPipe uses peer to peer networking similar to some game programs to share data over the Internet. This may mean that you have to open ports through firewalls and routers. More on this later.



Finally the Program Starts!

Yes, the program may now begin, but unless you have imported your information from RSP 1.X you are reminded to fill out the rest of your **Identity** information. You will receive this reminder each time you open RSP II until you have adequately satisfied the requirement. On the **Options / Identity** panel you will find spots for coordinates, location description, observer name, and other items that will be stored with your data. This is called metadata, and is comprised of facts that make your observed data useful to you and others at a later time. It is data about your data; a context for your observations.

Without metadata, a strip chart is just a squiggly line.

The next thing in your way is the Hints screen. You can disable Hints but you might find them useful in your early stages of RSP usage. You may also see the Radio-SkyPipe News window. This window informs you of available updates, workarounds for problems, and tips for usage. If left at the default setting Radio-SkyPipe will check online for updates to Radio-SkyPipe News every time you start the program.

Super Quick Start !

Assuming you have a sound card in your computer you may be ready to collect data. First, click the Mode menu item and make sure **Stand Alone** mode is selected. Stand Alone mode means that you will be collecting data locally on your computer and that you will NOT be sharing this data over the internet with others. Click the **Start** button. The chart should begin collecting data at 10 samples/sec. The strip chart trace may just be a wavy line or a steady one, but it should progress from left to right. Of course it represents nothing but the background noise in your sound card unless you are feeding your sound card with a signal and have RSP configured to select the proper sound card input. After the trace reaches the right hand side of the chart the chart will begin scrolling to the left with new data points always appearing at the right. While the chart is scrolling, let's start playing with some of those arrow buttons under the Start button. These buttons will operate on the chart "paper" by default, so when you press the down button in the upper left hand corner the trace will appear to move upwards. If you look, however at the numerical level on the Y axis where the trace appears, you will see it remains unaltered. Only the viewable part of the chart paper has changed. In other words pressing the Down arrow is the same as looking further "down" the Y axis. If you just can't get used to this behavior you can change it later in the options.

If you press either the right or left pointing arrow buttons the chart will stop. Don't worry, new data is still being collected, you are just being given the opportunity to inspect any portion of the chart without it being on the move. Try clicking on the chart and dragging it to the left or the right. When you have finished this you must push the **Auto-Scroll Enable** button to return to the live view of the chart. That is the button with two arrowheads pointing to the right:



Press the **Stop** button to stop collecting data. You will be given an option to save the chart to disk. Select **Cancel** for now. There are many logging options available on the **Options / Logging** panel, including whether or not you want to be prompted to save the data and where your default data directory will be located.

What is a Data Source?

You probably already have some idea of what you want to chart. It can be just about anything that can be electronically measured. This could be the temperature in your water heater, the amount of light falling on your roof, battery drain of your new gizmo, or yes the strength of radio noise arriving from a distant galaxy. Step one is to translate the phenomenon you want to measure into an electrical signal that the computer can read. There are two primary ways to handle this problem. If your signal consists of an electrified sound wave, you can feed the signal into the computer sound card. Sound consists of rapidly changing vibrations. It never sits still. Only this type of signal can be recognized by the computer sound card.

Other types of signals, those that change slowly, are best read by a device called an *analog to digital converter* or ADC. You could visualize an ADC as a little guy in a box with a volt meter. He reads the voltmeter and types in a coded signal on his little computer terminal. Then he presses a button which sends the voltage reading to your PC. The ADC can connect to your computer by a number of routes; a parallel port (remember those?), a serial port, a USB port, or even via a network connection. ADCs vary in how finely they can measure (resolution), their range allowable of voltage input, how quickly they can make a measurement, and how many channels of data they can handle.

More on Sound Data

The sound card has the ability to select from several inputs. The four primary ones are microphone, line input, and wave, and stereo mix. Some laptops do not have line inputs. Line inputs would normally be used to bring a rather weak audio signal such as from a tape deck (do those still exist?) or MP3 player into the computer. This is the preferred input port when you are feeding a radio signal to the PC. A miniature stereo jack is used for most line inputs. You will need to use an appropriately wired patch cord. Microphone inputs consist of three wires also but one of the wires supplies a small DC voltage to power the typical microphone. Wave and Stereo Mix inputs are internal. These inputs can be tied to digital sound streams from the internet or files. If you had a sound delivered from a streaming audio source like **SHOUTcast**™ you could use Wave or Stereo Mix input as the source. Your computer sound card may work with the Wave or Stereo Mix input or neither! There is no standard. You will have to experiment but usually one of these two options will work. RSP 2 has a built-in Record Mixer utility found under [Tools / Mixer \(Input Sound Settings\)](#). If you cannot get RSP 2 to work using this utility you will have to disable it and try using the built-in [Windows Mixer](#). There is info on how to do that in the Help.

What about those ADCs?

Radio-SkyPipe II supports a couple of different ADCs. There are cheap ADCs you can make using the MAX186 or MAX187 integrated circuits. Currently there is only a design for the parallel port using these devices, but a USB alternative exists with two [LabJack ADC](#) models. In addition it is possible to support other devices using the UDS model drivers available to Pro version users. To configure for an ADC you need to go to Options / Data Source and click on the ADC Setup button. The Help pages will provide you with details about this process.



Note that ADCs cannot handle audio signals without some additional circuitry. They are suited for measuring slowly changing voltages.

Selecting Your Data Source

Whether you use an ADC or the sound card you need to tell RSP 2 which input device you want to feed each channel with. (Note that in the Free Version of RSP2 you are limited to recording a single channel on your chart at a time, however, you may still use either an ADC or sound card input.) You select the data source on the [Options / Data Source](#) panel. When using a sound card you will select either **Sound Card Right** or **Sound Card Left** depending on which sound card input you want to use. You will also select a Detection Method. This is a more advanced topic. For now you can just leave it as

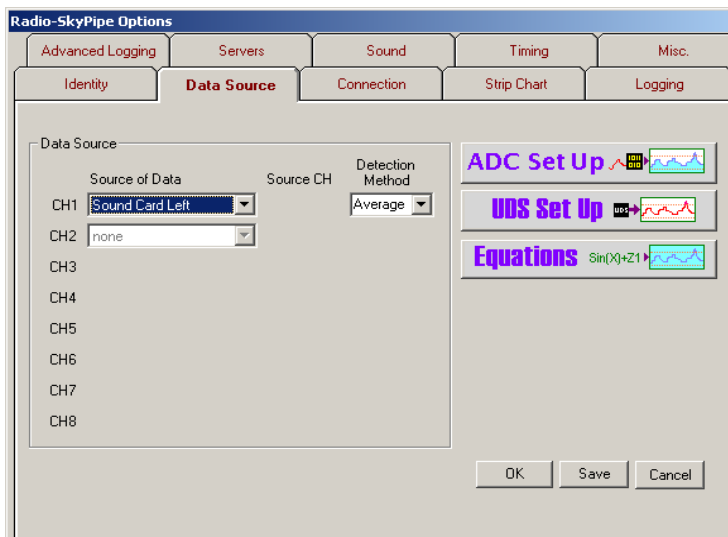
Average.

If you use a multichannel ADC you will have to select the Source Channel. For example your chart CH1 channel might map to the second channel on your ADC device.

Pro users will also have access to UDS devices and Equations as sources of data.

Sample Rate Selection

Let's hit one more essential topic concerning Stand Alone operation. You will want to select a sample rate, the number of samples per second, that is appropriate for your use. If you are measuring something that changes very slowly, then it does not make sense to sample at a very high rate because most of your data points will be duplicates. If however the phenomenon that you wish to measure can change rapidly then you want to sample at faster a rate that will capture these changes. To select the sample rate go to [Options / Timing](#) and set the **Sample Period**. The sample period is declared in milliseconds (thousandths of a second) and is just the inverse of the sample rate multiplied by 1000. Examples:



Sample Rate (samples per second)	Formula	Sample Period (milliseconds)
1	$1/1 * 1000$	1000
2	$1/2 * 1000$	500
4	$1/4 * 1000$	250
8	$1/8 * 1000$	125
10	$1/10 * 1000$	100
20	$1/20 * 1000$	50
25	$1/25 * 1000$	40


Whenever you make changes to settings like this in your options remember to click the **Save** button if you want these new settings to appear the next time you start the program.

Client Mode Operation

One of Radio-SkyPipe's most important features is its ability to share real-time data over the internet. [Client Mode](#) puts you on the receiving end of such a connection where you will be charting data that is being collected at some remote location. There are two ways to switch to Client Mode operation. If you are collecting data locally on your own computer, you can open a Client Mode window by selecting **View / New Client Window**. A second chart window will open in Client Mode. If you are not going to use the primary chart window for collecting your own data, you can also use it Client Mode. Thus you can have two Client Mode charts even in the Free Version of RSP. To run the primary

chart window in Client Mode, just select **Mode / Client**.

When in Client Mode you are shown a list of RSP users that currently have “published” their charts. This means they are making their Server Mode charts available for Client Mode users to connect to. Double click on one of the charts in the list and a connection will be established provided that you and the remote user have all of your settings correct in your computers and routers. Usually, connection problems are on the servers side, but make sure you have selected the proper settings on your [Options / Connection](#) panel. There are several help pages dedicated to the issues that arise in connecting server and client.

If your first attempt to connect to RSP server fails, try a few different servers before assuming you have a problem on your end. Just because they are published does not mean that servers are 'connectable'. Once you achieve a connection, you will see the chart begin to accumulate data. To see information about the remote server press the little 'I' (for Info) button  below the arrow buttons. This Info page is also available for charts that you load from disk. The Info page gives you access to a charts metadata.

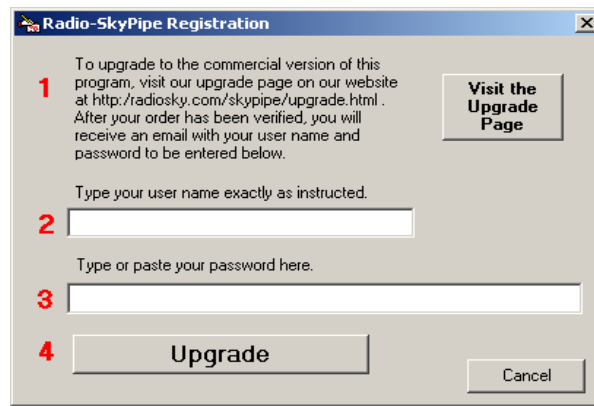
Server Mode Operation

[Server Mode](#) is simply Stand Alone Mode with a network connection. By using this mode you opt to send your data in real time to some other computer via the network. This can be a local connection where you are just sending the chart from one room to another in the same building, or via the internet and to several clients around the world. You can make the data public by pressing the P (for *Publish*) button, or opting to publish automatically when in server mode. Publishing puts you on the list that Client Mode users see. If you just want to use your data locally between computers on your LAN you will have to define the RSP server in the [Options / Server](#) list.

Again success in server operation requires attention to all of the security features built into your computer operating system, added firewalls, and external routers. Read the help pages carefully about these issues and seek the help of a IT specialists if you work within a school or business.

Upgrading to the Pro Version

When you download RSP it appears as a feature limited Free Version. After you have purchased an upgrade license key and a applied this to the program, you will have the Pro Version with a large number of additional features at your disposal. To upgrade to the Pro Version click on the **Upgrade** menu item and select **Upgrade Registration**. The following panel will appear:



Your first step is to purchase the appropriate upgrade license from the Radio-Sky Publishing website. After the order has been verified, I will send you a user name and password by email that you can copy and paste into the appropriate slots on the Upgrade Registration panel. You then click the Upgrade button and are prompted to restart the program. When the program restarts it will have all of its features open to you. The program will retain these advanced features for all subsequent releases of the same major version level (currently version 2.X). While updates are common they are usually in small increments and the major version number has only changed once in 10 years. In other words, I will not bother you very often for new update fees.

How to Learn More

Radio-SkyPipe is a feature rich program and it can take a while to master all that it can do. It also can be operated quite successfully with just limited knowledge. You will decide how many features you need for your application. There are numerous [Help pages](#) available online. You are also welcome to ask questions that are not answered by the Help pages. Pro users will by necessity receive priority help but I will certainly try to help all users. Please use the [Contact](#) form on the Radio-Sky Publishing website to reach me.