

SWR Plotter

(Version 2.0.2 -- Released August 16, 2013)

Introduction

SWRplotter is a utility to display and/or print SWR graphs of an antenna system using a model **FLEX-3000** or model **FLEX-5000A** transceiver manufactured by **FlexRadio Systems**[®] of Austin, TX, running **PowerSDR**[®] software.

NOTE: This program will not work with the model **FLEX-1500** transceiver or with the V/U module in the **FLEX-5000** transceiver.

The accuracy of the SWR plot is limited by the accuracy of the SWR reading obtained by the transceiver. Since **PowerSDR**[®] samples the forward power and the reflected power at different times, there can be some inaccuracy in the reading. However, the readings should be close enough to give you a good idea of how your antenna system is performing.

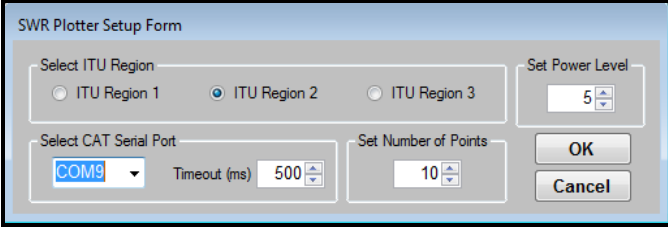
WARNING: This program will cause the transceiver to transmit short-duration, signals across the entire frequency range selected. You should always exercise caution not to cause harmful interference (QRM) to operations in progress.

Installation

Run the installation package file, **SWRPlotterSetup.exe**. This will install **SWRplotter.exe** and all required supporting files on your computer. The installer will suggest a default location for the program file. You may change the location or leave it at the default, it does not matter. However, the **SWRplotter.rtf** file must be located in the same directory as the **SWRplotter.exe** file.

Program Operation

The first time you start the program, the setup form shown in Figure 1 will be displayed.



The image shows a Windows-style dialog box titled "SWR Plotter Setup Form". It contains several configuration options: "Select ITU Region" with radio buttons for "ITU Region 1", "ITU Region 2" (which is selected), and "ITU Region 3"; "Set Power Level" with a spin box set to "5"; "Select CAT Serial Port" with a dropdown menu showing "COM3"; "Timeout (ms)" with a spin box set to "500"; "Set Number of Points" with a spin box set to "10"; and "OK" and "Cancel" buttons at the bottom right.

Figure 1 – Setup Form

You must select both your ITU region and the serial port used to communicate with **PowerSDR**[®] before the program will function. The other setup parameters can be left at their default values.

When you click on "OK", the main program screen, shown in Figure 2, will be displayed.

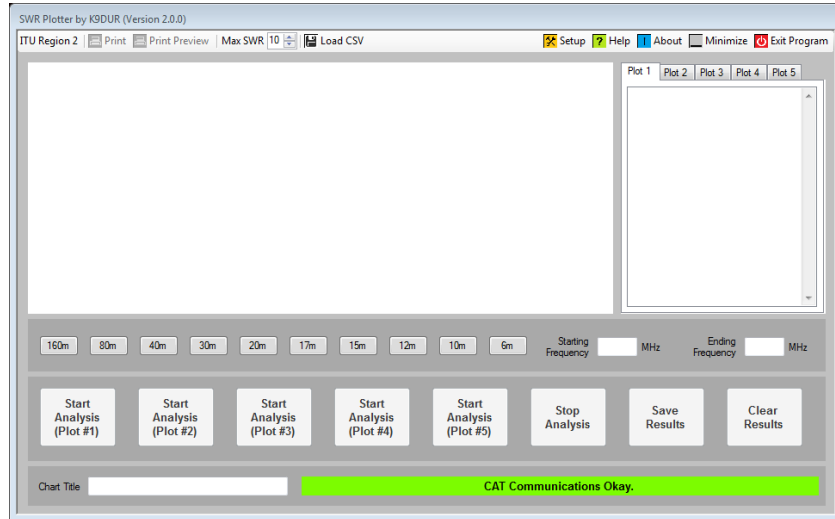


Figure 2 -- Main Screen at Initial Start-Up

Click on one of the band buttons to select the desired band. A screen similar to the one shown in Figure 3 will then be displayed.

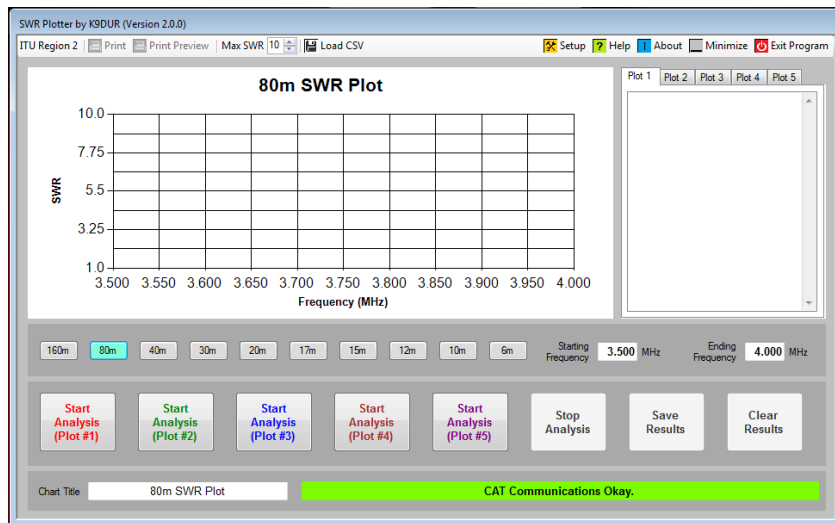


Figure 3 -- Main Screen with Band Selected

Click on one of the buttons labeled "Start Analysis" to plot the SWR over the frequency limits selected. A typical SWR plot is shown in Figure 4. You can stop an analysis before it has completed by clicking on the button labeled "Stop Analysis".



Figure 4 -- Main Screen with SWR Plot

You can plot up to 5 analyses on the same chart by clicking on the appropriate button. An example of a chart with 2 plots is shown in Figure 5.

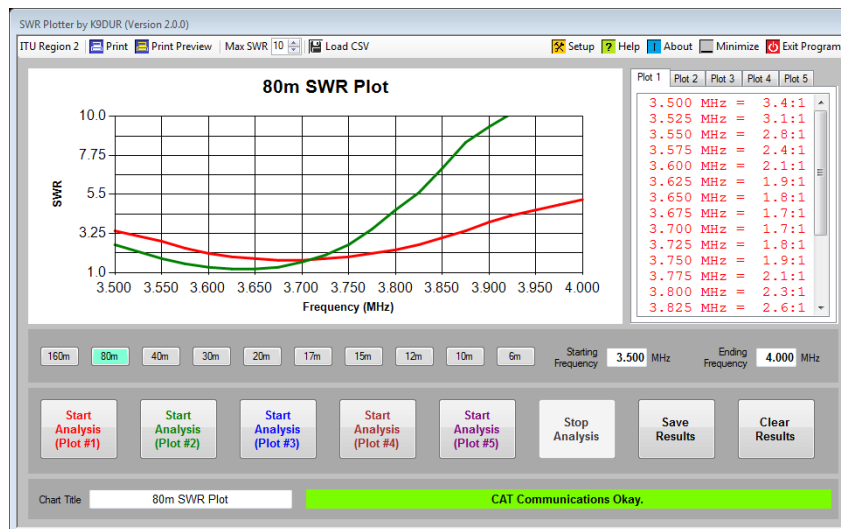


Figure 4 -- Main Screen with 2 SWR Plots

Each analyses is plotted with a different color which matches the color of the text of its corresponding start button.

You can display the SWR values for each plot by clicking on the appropriate tab at the top of the box containing the SWR values. The text color used to display the SWR values for the plot is the same color used to plot the values on the chart.

NOTE: All of the plots must be over the same frequency range and must have the same number of points.

Customizing the SWR Chart

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By default, the plot will cover the entire band for your ITU-region. You can select a narrower frequency range by typing in new starting and ending frequencies in the boxes provided according to the following conditions:

- The starting frequency must be within the selected band.
- The ending frequency must be within the selected band.
- The starting frequency must be below the ending frequency.
- The starting & ending frequencies must be at least 1kHz apart.

If you change the frequency limits of the analysis, the chart will be reformatted to only display the selected portion of the band.

You can change the maximum SWR displayed on the chart by using the up-down control on the toolbar. The value can be adjusted from 2:1 to 10:1. This value can be changed either before or after a chart is plotted.

You can change the title displayed/printed at the top of the chart by editing the text in the box labeled "Chart Title".

Saving the Results

You can save your results to a comma-delimited variables (.csv) file by clicking on the button labeled "Save Results". You can import the .csv file into a spreadsheet program such as Excell for further graphing and analysis.

Clearing the Results

You can clear the results by clicking on the button labeled "Clear Results".

Printing the SWR Chart

After an analysis is complete, you can click on either the "Print" button or the "Print Preview" button on the toolbar to print your SWR plot.

Clicking on the "Print" button will open a print dialog window where you can select the printer to use.

Clicking on the "Print Preview" button will open a print preview dialog window where you can see what the printed chart will look like before printing it.

Setup Form

Clicking on the "Setup" button on the toolbar will display the form shown in Figure 5.

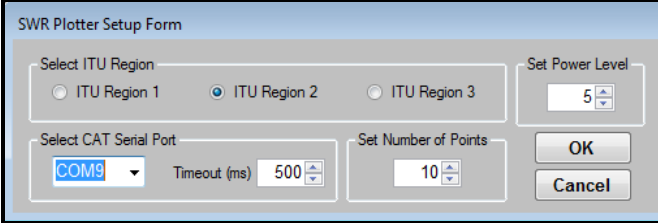
The image shows a dialog box titled "SWR Plotter Setup Form". It contains several controls: "Select ITU Region" with radio buttons for ITU Region 1, ITU Region 2 (selected), and ITU Region 3; "Set Power Level" with a numeric spinner set to 5; "Select CAT Serial Port" with a dropdown menu showing COM9; "Timeout (ms)" with a numeric spinner set to 500; "Set Number of Points" with a numeric spinner set to 10; and "OK" and "Cancel" buttons at the bottom right.

Figure 5 – Setup Form

Select ITU Region

You must select your ITU region to determine the frequency ranges over which **PowerSDR**[®] will allow the transceiver to transmit.

Note to Users in Hungary: The 40m allocation in Hungary does not conform with the rest of ITU Region 2. Therefore, when doing an analysis on 40m you must remember to select an ending frequency of 7.100 MHz or less. You can also contact support@rnacs.com to receive a customized **BandLimits.xml** file with the Hungarian 40m allocation.

Select CAT Serial Port

This dropdown list shows all of the serial ports available on your system. Select the port to be used to communicate with **PowerSDR**[®].

NOTE: This is **NOT** the serial port specified in **PowerSDR**[®] for CAT control. It is the other port in the virtual serial port pair specified in **PowerSDR**[®] for CAT control. For example: If you have a virtual serial port pair of COM7 & COM8, and **PowerSDR**[®] is set to use COM7, then you would set **SWRplotter** to use COM8.

Serial Port Timeout

This box allows you to adjust the timeout period for the CAT communications from the default value of 500ms up to a maximum of 2000ms. The default value should be adequate for most users. However, it can be increased if problems arise with the serial communications timing out. Increasing the timeout time will increase the time it takes to perform an analysis.

Set Power Level

This box allows you to set the power level used during the analysis. You want to use as low a power as possible to minimize QRM. However, **FlexRadio Systems**[®] has not evaluated the accuracy of the SWR measurement at very low power levels. The default value of 5 (~5W) should be a good compromise.




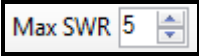

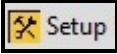
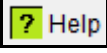
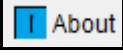


Set Number of Points

This box allows you to set the number of points plotted during an analysis to any value between 1 and 49. The default value is 10. Note that the actual number of points plotted is one more

than the number specified. Increasing the number of points will result in a smoother curve, but it will take more time for the analysis to complete. At the default timeout of 500ms, it takes approximately 2 seconds to plot a point. Therefore, using the default value of 10 points, it takes about 20 seconds to complete an analysis.

Toolbar

The toolbar contains the following items (left-to-right):

	This is a label that displays the currently-selected ITU Region.
	Clicking on this button will open a print dialog box so you can print the SWR chart.
	Clicking on this button will open a print preview dialog box so you can view the SWR chart on screen before printing it.
	Changing this value changes the maximum SWR displayed on the chart. It is adjustable from 2:1 to 10:1.
	Clicking on this button will allow you to load a .csv file that you have previously written with the "Save Results" button.
	Clicking on this button will display the setup form.
	Clicking on this button will open a window to display this document.
	Clicking on this button will open a window that displays basic information about the program.
	Clicking on this button will minimize the main window.
	Clicking on this button will close the program.

About the Author

SWRplotter.exe was written by Ray Andrews, K9DUR.

Ray holds an Amateur Extra class license and was first licensed in April 1960. He currently resides in West Terre Haute, IN, and is a retired electronic design engineer and software developer. He operates a small custom software consulting business just to keep him out of mischief between camping trips.

For more information, visit Ray's web pages:

<http://k9dur.info>

<http://www.rnaconsultingservices.com>

Revision History

v2.0.2 – August 16, 2013 -- Fixed bug causing wrong number of points to be plotted for certain frequency step sizes.

v2.0.1 – August 16, 2013 -- Fixed bug where Save Results & Clear Events buttons were not being enabled under certain combinations of band limits & number of points settings.

v2.0.0 – August 13, 2013 -- Added multiple plot capability. Added Save/load .csv file capability.

v1.4.0 – February 7, 2013 -- Added list of plotted SWR values to printed charts. Fixed bug preventing fractional SWR values from being plotted correctly by European users.

v1.3.0 – February 5, 2013 -- Added list box with plotted SWR values.

v1.2.1 – February 5, 2013 -- Changed to restore original frequency after analysis.

v1.2.0 – February 4, 2013 -- Added ability to change maximum SWR shown on Y-axis of chart. Fixed bug requiring program restart for change in COM port to take effect.

v1.1.2 – February 2, 2013 -- Fixed bug causing program to hang if started when PowerSDR is not running or if serial port not set correctly. Corrected number of points plotted if only a portion of the band is being scanned. Changed formatting of chart to match portion of band being scanned.

v1.1.1 – February 1, 2013 -- Fixed bug preventing charts from printing.

v1.1.0 – February 1, 2013 -- Added adjustable timeout setting. Added status display. Changed to compile as 32-bit application. Fixed bug preventing restoration of original tune power level.

v1.0.0 – January 31, 2013 -- Initial Release.

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