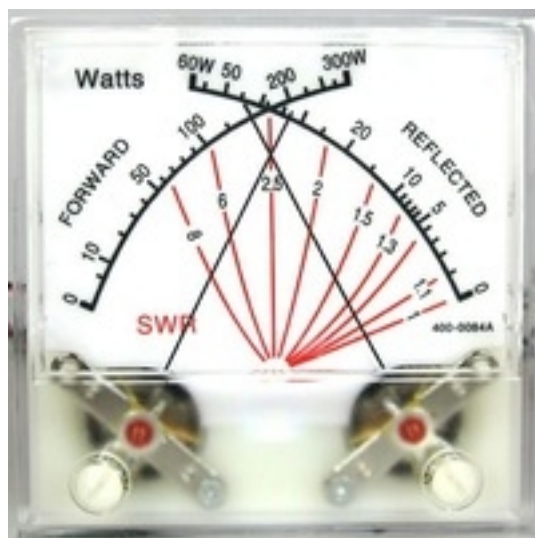


# SWRPlotter6k

(Version 1.2.1 -- Revised: May 23, 2016)



## Users Guide

*Ray Andrews, K9DUR*

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## INTRODUCTION

**SWRplotter6k** is a utility to display and/or print SWR graphs of an antenna system using a **FLEX-6xxx** model transceiver manufactured by **FlexRadio Systems**® of Austin, TX, running **SmartSDR**® software.

The accuracy of the SWR plot is limited by the accuracy of the SWR reading obtained by the transceiver. Since **SmartSDR**® samples the forward power and the reflected power at different times, there can be some inaccuracy in the reading. To minimize the error, **SWRPlotter6k** takes 100 SWR readings for each point and plots the average value.

**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.

## SYSTEM REQUIREMENTS

The computer used must meet the following minimum requirements:

- **Operating System** -- Windows XP (sp3.51), Windows Vista, Windows 7, Windows 8
- **Minimum Available Disk Space** -- 2 Mb

**SWRPlotter6k** is a 32-bit application. Therefore, it will run on systems with either a 32-bit or a 64-bit processor.

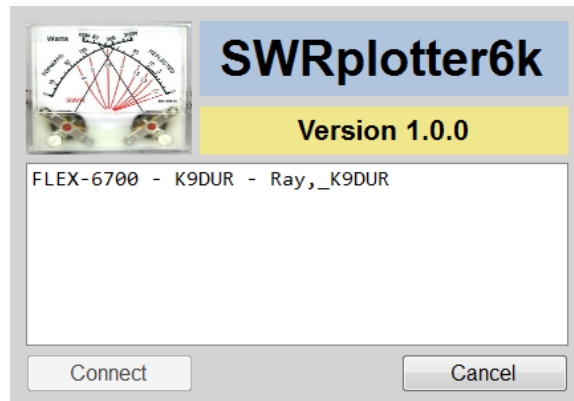
## INSTALLATION

Run the installation package file, **SWRPlotter6kSetup.exe**. This will install **SWRplotter6k.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.

## PROGRAM STARTUP

Before starting **SWRPlotter6k**, make certain that the **SmartSDR** client is running & there is at least one active slice receiver.

When **SWRPlotter6k** starts, it will check for the presence of a FLEX-6xxx radio on the LAN. If one is found, then the window shown in Figure 2 is displayed.



**Figure 1 -- Startup Window**

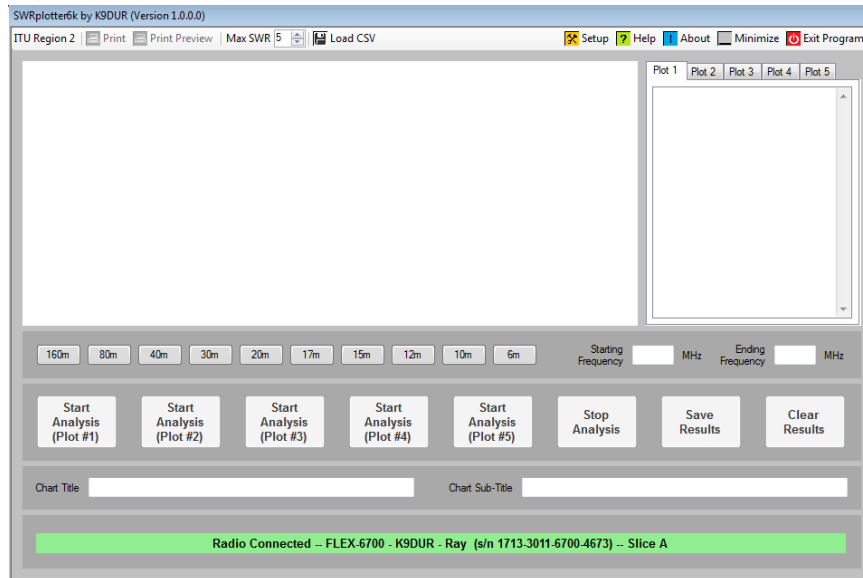
Click on the radio you wish to use to highlight it. If there is only one radio in the list, it should already be highlighted.

Click on "Connect" to connect to the radio and proceed to the main window.

Clicking on "Cancel" will close the program.

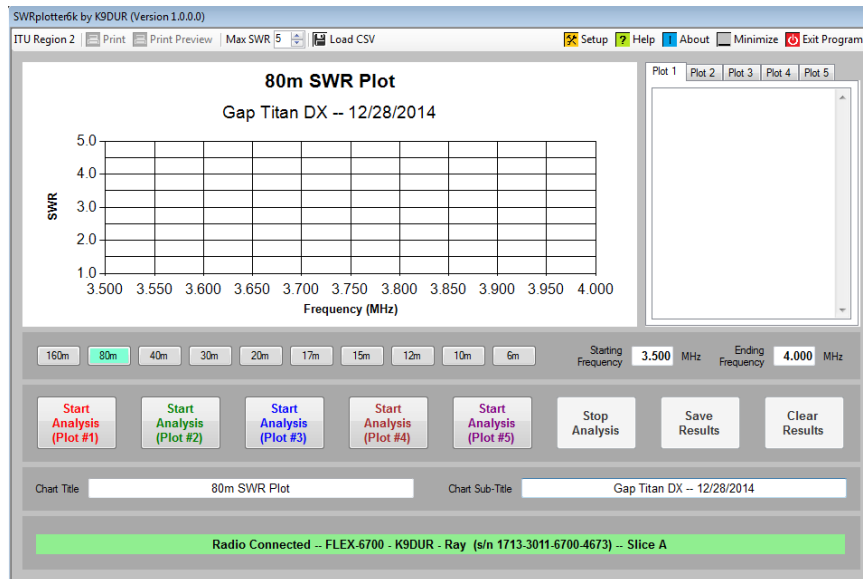
## PROGRAM OPERATION

After you have connected to the desired radio, then the main window shown in Figure 2 is displayed.



**Figure 2 -- Main Window**

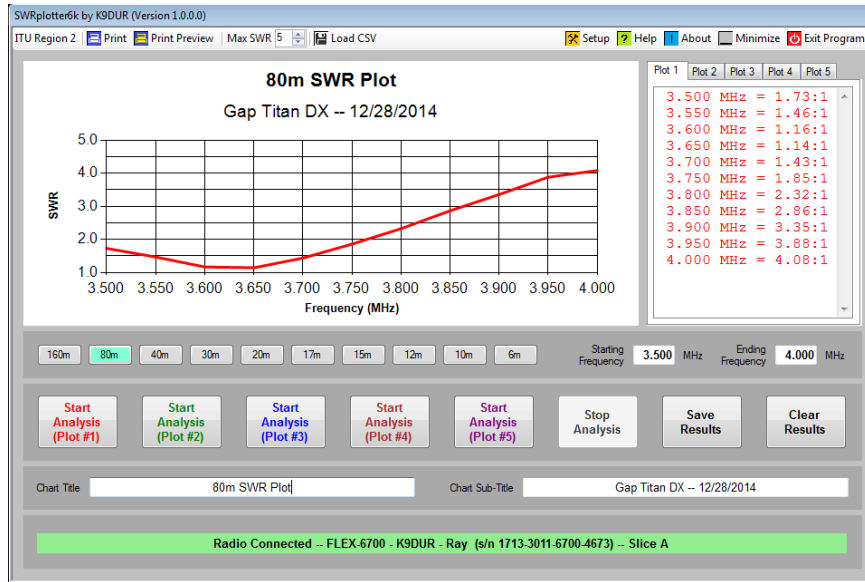
Click on one of the band buttons to select the desired band. A screen similar to the one shown in Figure 3 will then be displayed.



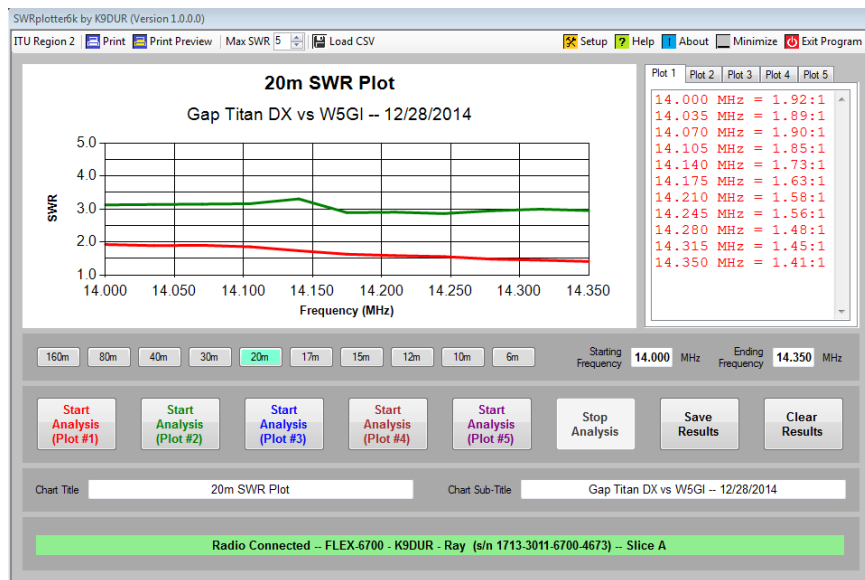
**Figure 3 -- Main Window with Band Selected**

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 Window 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 5 - Main Window with 2 SWR Plots**

Each analysis 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

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 & sub-title displayed/printed at the top of the chart by editing the text in the boxes labeled "Chart Title" & "Chart Sub-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

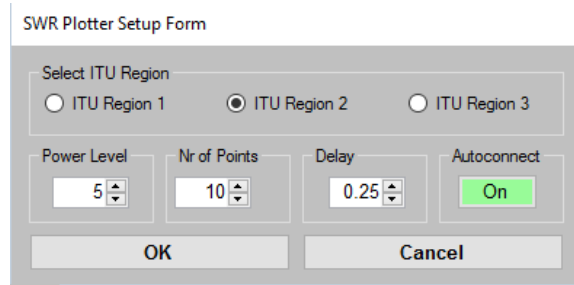
After an analysis is complete, you can click on either the "Print" button or the "Print Preview" button on the toolbar to print your SWR plot.

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

Clicking on the "Setup" button on the toolbar will display the form shown in Figure 6.



The image shows a dialog box titled "SWR Plotter Setup Form". It contains the following elements: a "Select ITU Region" section with three radio buttons: "ITU Region 1" (unselected), "ITU Region 2" (selected), and "ITU Region 3" (unselected); a "Power Level" section with a spinner box set to "5"; a "Nr of Points" section with a spinner box set to "10"; a "Delay" section with a spinner box set to "0.25"; and an "Autocconnect" section with a green button labeled "On". At the bottom are "OK" and "Cancel" buttons.

Figure 6 – Setup Form

### SELECT ITU REGION

You must select your ITU region to determine the frequency ranges over which **PowerSDR**<sup>®</sup> 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](mailto:support@rnacs.com) to receive a customized **BandLimits.xml** file with the Hungarian 40m allocation.

### 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**<sup>®</sup> 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.

### SET DELAY

When obtaining an SWR reading from the radio, **SWRPlotter6k** will make several attempts to obtain a non-zero reading. This box allows you to set the delay between attempts. The delay can be set to any value between 0.25 and 5.0 seconds. The default value is 0.25 seconds. Normally this setting is left at the default value.

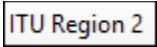


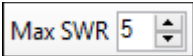
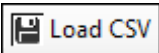




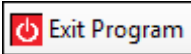


## AUTOCONNECT

This button allows you to turn autoconnect on or off. If autoconnect is turned on, **SWRPlotter6k** will connect to the first radio it finds on startup.

## 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.

## SOFTWARE LICENSE AGREEMENT

Software written by Ray Andrews, K9DUR, for amateur radio use may be freely copied by any licensed amateur radio operator for their own personal use.

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No warranty, expressed or implied, is conveyed for the use of the software or for the installation of the software on any computer.

## ABOUT THE AUTHOR

**SWRPlotter6k** 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:

## REVISION HISTORY

- v1.2.1 – May 23, 2016 – Additional modifications to SWR code to avoid SWR values of 0.0. Added time delay after frequency change and after turning on tune mode to give radio chance to settle.
- v1.2.0 – Dec 13, 2015 – Modified SWR code to avoid SWR values of 0.0. Added adjustable time delay between SWR points.
- v1.1.6 – Oct 31, 2015 – Re-compiled with updated version of clsSSDR. No other changes.
- v1.1.5 – Mar 23, 2015 -- Corrected SWR display in chart if SWR >10:1.
- v1.1.4 – Mar 23, 2015 -- Re-compiled with SmartSDR API v1.4.0. Fixed bug causing every other point to plot SWR of 0.0.
- v1.1.3 – Dec 29, 2014 -- Fixed bug causing unhandled exception error if user tried to run a plot with no transmit slice.
- v1.1.2 – Dec 29, 2014 -- Fixed bug causing endless loop if power is lost to radio or if radio is turned off while it is connected.
- v1.1.1 – Dec 29, 2014 -- Added code to retry up to 3 times if SWR of 0.0 is returned. Fixed bug displaying wrong version number on startup screen.
- v1.1.0 – Dec 28, 2014 -- Added chart sub-title. Fixed typo in printed page footer. Corrected errors in documentation.
- v1.0.0 – Dec 28, 2014 -- Initial Release.