# Antenna Analyzer Usage
# Field Day Training

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Clearwater Amateur Radio Society


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# Functions of an Antenna Analyzer

- Rapid check-out of an antenna
- Tuning an antenna to resonance
- Comparing characteristics of an antenna before and after a specific event (rain, hurricane, etc.)
- Making coaxial stubs or measuring their parameters
- Cable testing, measuring cable loss and characteristic impedance
- Measuring capacitance or inductances of loads



## Slide 2

**BF1** Botero, Fred, 6/8/2022

# Antenna Analyzer
# Rig Expert AA-55 Zoom

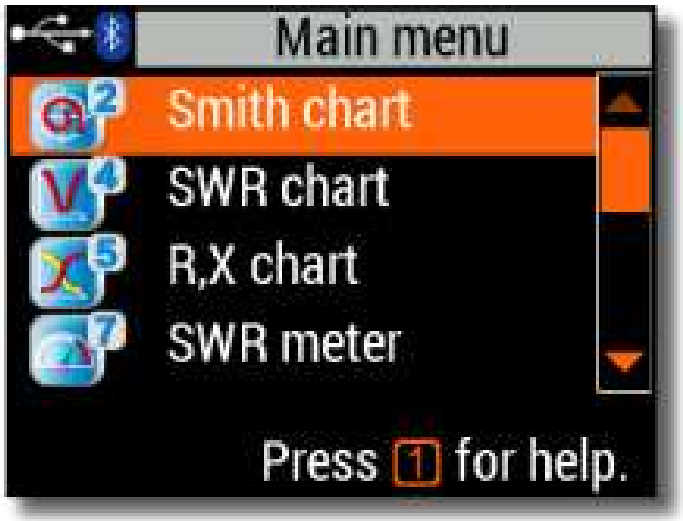
The analyzer is designed for measuring SWR (standing wave ratio), return loss, cable loss, as well as other parameters of cable and antenna systems in the range of 60 kHz to 55 MHz.

A built-in ZOOM capability makes graphical measurements especially effective.

The AA-55 ZOOM Option Bluetooth version is equipped with a Bluetooth module for a wireless connection with your laptop, tablet or smartphone.


1. Antenna connector
2. Liquid crystal display
3. Keypad
4. USB connector

# Main menu




The Main menu acts as a starting point from where different tasks may be launched.

Use ▲ (Cursor up) and ▼ (Cursor down) keys to scroll through the menu, then press ✓ (OK) to select an item.

For your convenience, a battery indicator is shown at the top-left corner of the screen. This indicator is replaced with a USB icon when the analyzer is connected to your computer.

*You may use hot keys for the quick access to certain tasks. For instance, press the* **4** *(SWR chart) button to open the SWR chart screen immediately.*

## Multifunctional keys

Most keys on the analyzer's keypad perform several functions.

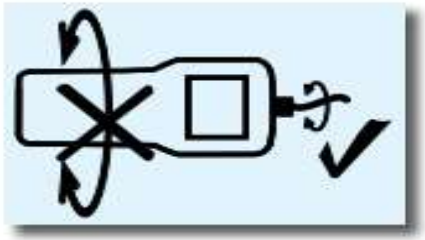
For instance, numbers (1) are used to enter frequency and other numerical parameters. Main functions (2) provide quick access to most common tasks. Alternative functions (3) are executed if the user holds the F (Functional) key. For the convenience, alternative functions are marked with yellow.


*You may press the* **1** *(Help) key to open a help screen listing all active hot keys.*

## Connecting to your antenna

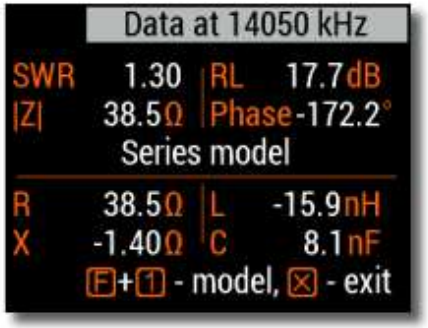
Plug the cable to your analyzer's antenna connector, and then tighten the rotating sleeve. The rest of the connector, as well as the cable, should remain stationary.

*If you twist other parts of the connector when tightening or loosening, damage may easily occur. Twisting is not allowed by design of the UHF-connector.*



## Data screen

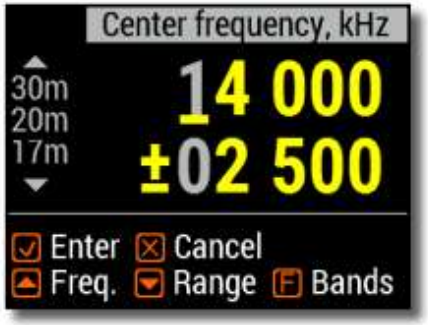
The data screen is available in all chart modes. Press the **0** (Data) key to display various parameters of a load at cursor.




## Frequency and range entry

To enter the center frequency or the sweep range, press the **3** (**Frequency, Range**) key.

Use cursor keys to navigate, or the **0** to **9** keys to enter values. Do not forget to press the ☑ (OK) key to apply.




*Press ▲ (Up) or ▼ (Down) cursor keys while holding the F (Functional) key to quickly choose a radio amateur band.*

## Return loss chart

The return loss (**RL**) chart, which is very similar to the **SWR chart**, is activated by pressing the F (Functional key) and **4** (RL chart) key combination in the **Main menu**.

# Measure SWR at a specific frequency

## SWR mode

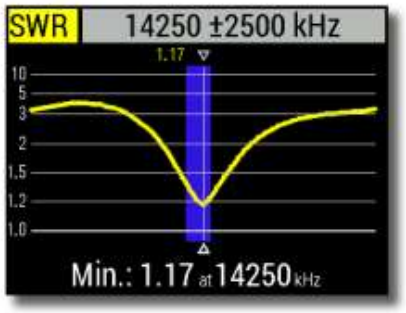
To watch the SWR at a single frequency, press the 7 (SWR) key.

Do not forget to press the ✓ (OK) key to start or stop the measurement. Change the frequency with ◀ (Left) or ▶ (Right) cursor keys, or press the 3 (Frequency) key to enter a new frequency.


*The SWR icon in the top-left corner flashes when the measurement is performed.*

# SWR graph with Frequency sweep

- Per graph the SWR at target 14.250 MHz is 1.17 which is excellent
- You can zoom in on the blue vertical area using the buttons to see more detail




## SWR chart

Once your antenna is connected to the analyzer, it is time to measure its characteristics. Press the 4 (SWR chart) key to open the SWR chart screen, then press ✓ (OK) to start a new measurement.

A few moments later, the result will be displayed on the analyzer's screen.

Press the F + ✓ key combination to run a continuous sweep.

*A small triangle at the bottom of the chart corresponds to a point at which the SWR reaches its minimum.*

## Chart ZOOM

Use the arrow keys to increase or decrease the center frequency or the scanning range. Watch the chart zooming in or out, or changing its position. Use the F (Functional key) and ▲ (Cursor up) or ▼ (Cursor down) key combination to zoom the vertical scale of the chart.

*Do not forget to press the ✓ (OK) key for the new measurement to start.*

*Press F (Functional key) and 0 to quickly choose a radio amateur band.*

# Parameter Results Display


## Display all parameters

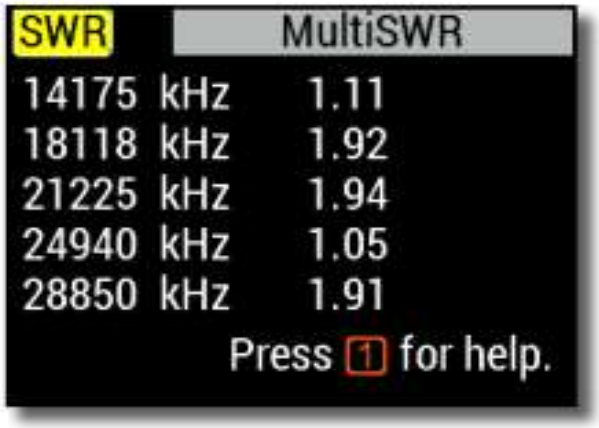
To display various parameters of a load on a single screen, press the **8** (All) key.

*Do not be confused by negative values of L or C. This can be useful for experienced users.*

# Multi-SWR Mode very useful for multiband resonant antenna measurement

## MultiSWR mode

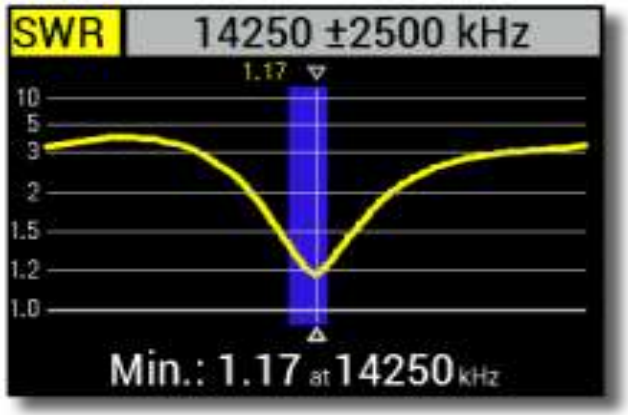
Press the F (Functional key) and 7 (Multi) key combination to see the SWR at up to five different frequencies. This mode may be useful for tuning multi-band antennas.




Use ▲ (Up) and ▼ (Down) cursor keys to select a frequency to be set or changed, then press the 3 (Frequency) key to enter a new value. Do not forget to press the ✓ (OK) key to start the measurement.

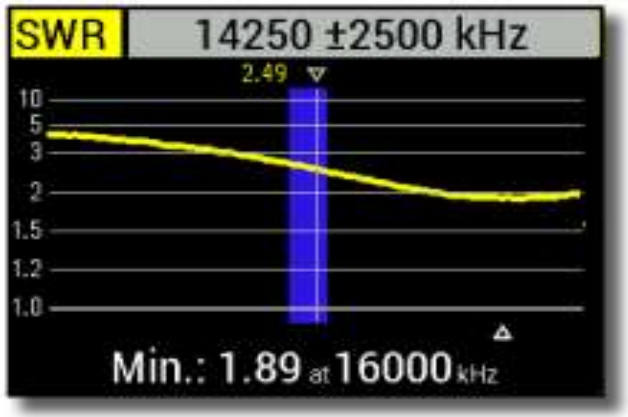
# Antennas

## Checking the antenna




It is a good idea to check an antenna before connecting it to the receiving or transmitting equipment. The **SWR chart** mode is good for this purpose.

The picture on the left shows the SWR chart of a HF antenna. The operating frequency is 14.25 MHz. The SWR at this frequency is 1.17, which is acceptable.

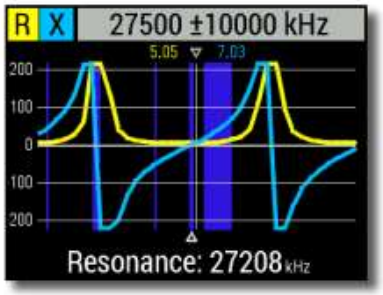



The next screen shot shows SWR chart of another antenna. The actual resonant frequency is 16 MHz, which is too far from the desired one. The SWR at 14.25 MHz is 2.49, which is not acceptable in most cases.

# Advanced Functions

- R, X Chart plots reactance performance across frequency sweep
- Resonance is the frequency crossing Y axis at zero

- Smith Chart plots reflection coefficients



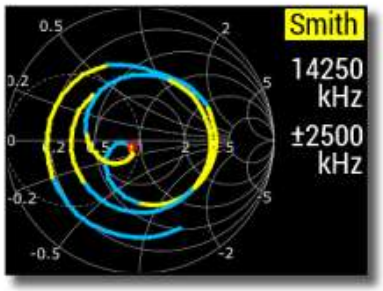

## R,X chart

Press the **5** (R,X chart) key in the **Main menu** to access the **R,X chart** mode.

Positive values of reactance (X) correspond to inductive load, while negative values correspond to capacitive load.

The chart will display **R** and **X** for series or parallel models of a load. Press F (Functional key) and **1** to switch between these models.

*The marker at the bottom of the screen shows a resonant frequency closest to the center of the scan.*




## Smith chart

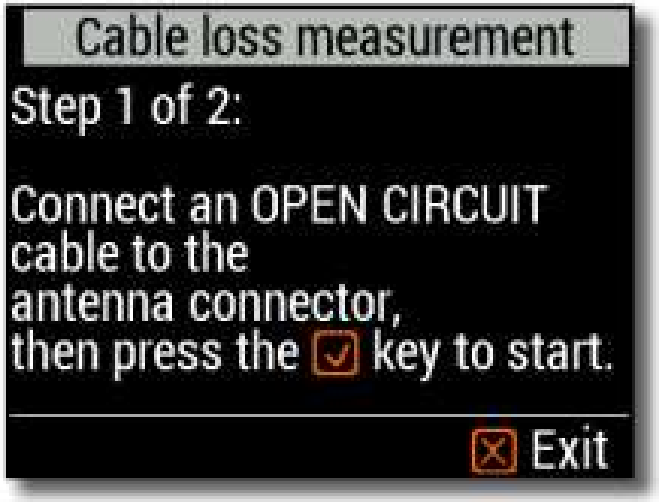
The **2** (Smith chart) key opens a screen where the reflection coefficient is plotted on the **Smith chart**.

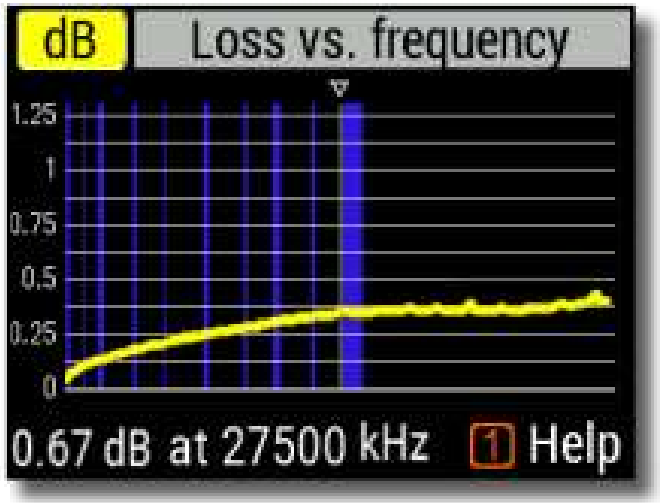
For a list of hot keys, press the **1** (Help) key, as usual.

*A small marker is used to indicate the center frequency.*

# Cable loss

- To measure the loss in a coaxial cable, connect a cable to the antenna connector of the analyzer. Make sure the far end of the cable is open circuited. Press (OK) to start.
- Next, short circuit the far end of the cable and press (OK) to continue. Once the analyzer finishes the measurement, you will see the Loss versus frequency chart.
- Use (Left) and (Right) cursor keys to change frequency and watch the loss value in decibels at the bottom of the analyzer's screen. To see the list of other keypad shortcuts, press the (Help) key



# Practical Hands-On Usage
# Let’s do this!

- Measurement of properties on a known Dummy Load
- Measure SWR of an antenna
- Frequency sweep on an antenna
- Multi-SWR chart results on a multiband antenna
- Data Table of results

# Questions?

Please sign the Attendance Log and
Thank you for learning with us!